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Frank. W1WY
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Larry. N6AR
Bob. K3EST
Cass. WA6AUD
Leo. W4KA
Dave. K4TWJ
George. W3ASK
Dorothy. WB9RCY
Steve. WB2WIK
Norm. K6NDL
Fred. W[illegible]
Joe. W[illegible]
Bert. W[illegible]
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THE RADIO AMATEUR'S JOURNAL

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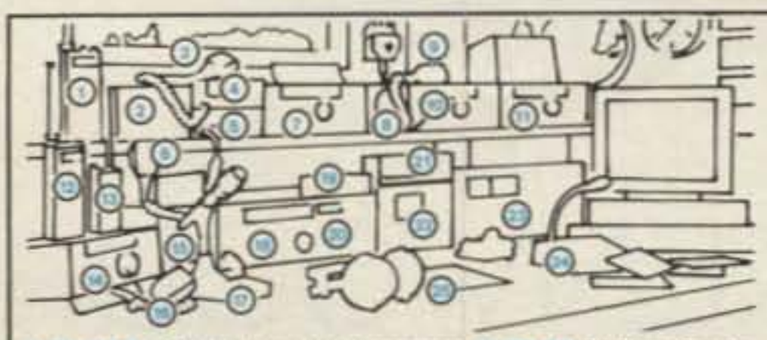

1) **TH-315A:** 220 MHz Hand-held Transceiver; 2) **PS-50:** DC Power Supply; (3) **MC-43S:** UP/DWN Microphone, included with (4) **TM-2530A:** Deluxe 25 W, 2m FM Transceiver; (5) **TM-3530A:** Deluxe 25 W, 220 MHz Transceiver (also comes with MC-43S mic.); (6) **MC-48B:** 16-key DTMF Microphone; (7) **R-5000:** High Performance Receiver; (8) **SP-430:** Matching External Speaker for TS-430S/TS-440S; (9) **MC-48B;** (10) **TS-711A:** 2m, 25 W All Mode Base Transceiver; (11) **TS-811A:** 70cm, 25 W All Mode Base Transceiver; (12) **TH-215A:** 2m, Full-featured HT; (13) **TH-21BT:** Pocket-sized, 2m FM Transceiver; (14) **TS-440S:** HF Transceiver (with AT-440 installed); (15) **SP-940:** Matching External Speaker for TS-940S; (16) **MC-48B;** (17) **MC-60A:** Base Station Microphone with UP/DWN controls; (18) **TS-940S:** Competition Class HF Transceiver with General Coverage Receiver (AT-940 installed); (19) **IF-232C:** Computer Interface Level Translator; (20) **IF-10B:** Computer Interface Module (installed inside TS-940S); (21) **SW-2000:** SWR/Power Meter; (22) **SM-220:** Station Monitor with pan display option BS-8 installed; (23) **TL-922A:** HF Linear Amplifier; (24) **MC-85:** Multi-function Desk Microphone with Graphic Equalization and three outputs; (25) **HS-5:** Deluxe Headphones.

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Illustrator
Larry Mulvehill, WB2ZPI
Contributing Photographer

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The Radio Amateur's Journal

ON THE COVER: It looks like Santa will be visiting *CQ* staffers soon. It's a good time to leave some milk, cookies, and a QSL card for him. Photo by Larry Mulvehill, WB2ZPI.

DECEMBER 1988 **VOL. 44, NO. 12**

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Zero Bias

AN EDITORIAL

It's just about time to draw up the annual list of New Year's resolutions. You know, the ones you sort of keep for an hour or two: I'm not going to do this, I am going to try and do that, I'll give up this, I'll try to like so and so, etc. They're all conscious efforts trying to deal constructively with all of our foibles that we've come to love and accept. It's hard to give up or change those things after a number of years, even though the reasons we like them are not all that clear.

Well, amateur radio is like one of those New Year's resolutions. It's hard for some of us to pinpoint exactly what it is that we enjoy or admit that we actually enjoy it at all. The *why* of it all is really pretty deep, and in reality we all derive some sort of satisfaction from doing whatever it is that we do. It's just that most of us find it difficult to explain just what it is that we do, let alone why. I am reminded of three young men I overheard recently. I was in line for breakfast at the Boxboro Hamfest when the three men got in line behind me. One was telling the others of his attempts to interest his wife in his hobby of amateur radio. Her answer to him was "Why would I want to talk to people I don't know?" That's one of those fundamental "why" questions that most of us just accept as "that's what you're supposed to do; it's fun, challenging, a public service, a national duty" or any other rationale you can put on it. No matter what band or mode or what license we have, we all look forward to doing it, preferably over and over again, and we find it hard to understand those who don't want to do it, too.

What we have is an emotional attachment to a hobby (or if you insist, a service) that exists even for those who are no longer active or who have been inactive for long periods of time. The attachment doesn't exist for people seeing it for the first time, or for those people who hear about amateur radio via an article in the newspaper or more rarely from an amateur trying to get someone interested in the hobby. Under those circumstances the first response normally would be "Why would I want to do that?"

The "why" defies definition. I could reiterate the word *fun*, but that too is an abstraction unless you've tried it. People get interested in amateur radio by seeing it, hearing it, and most of all trying it. None of us formed a highly constructed intellectual attachment to amateur radio. It was an emotional response, an exhilaration in hearing someone talk back to us. The fact that we didn't know the person didn't matter at all after that. People who are involved in a hobby don't ask themselves why they are in it. They are in it because it is fun and enjoyable, and they derive a sense of satisfaction from it.

It's hard to convey in words exactly what the above means. You have to experience it. Giving someone a license course or code tapes for Christmas is a nice gesture, but it will have far more impact when it is accompanied by some time in the shack actually working a few stations. You sell amateur radio by giving it away and sharing it. Believe it or not, there is room enough for a lot more people to become involved in amateur radio. If you want to give someone information on amateur radio and a holiday gift, give the gift of time and share your excitement with him or her. Just set aside all the "whys" you can think of and the grandious accomplishments of a very few, and in 1989 just expose one person to a new world of fun. He or she will do the rest.

What's Happening?

For those of you looking for more QRP input, rest assured you're not alone. Ade Weiss, W0RSP, is off on a year's sabbatical from his teaching position, and the last we saw of him he was in Florida. His mail still goes to his regular QTH. Steve Katz, WB2WIK, has made a coast-to-coast move and is now residing in California. The move and job transfer have made column writing a lesser priority at the moment. We expect him to be contributing more material shortly. John Attaway, K4IIF, has decided to retire from his activities with *CQ*, and the mantle of DX Editor goes officially to Hugh Cassidy, WA6AUD. Hugh has been doing the column consistently for the last year or so.

There is a new official definition of the word *prefix* for our WPX Award Program, which will now bring the use of prefixes in line for all of *CQ*'s programs. We've been working out the details for some changes in the *CQ* 160 Meter WW Contest with respect to three plaques for US stations. The idea is to have an east coast, midwest, and west coast plaque awarded. This will tend to encourage more of you in this country to participate in this annual event without the continual fear of east coast domination. The rules in this issue do not reflect this idea, but we will have something in effect for the 1989 contest, so it pays to enter. There are a lot of exciting things ahead for the coming year as the sunspot cycle forges onward to a new high.

Travels With CQ

Since the last issue was prepared we've done some traveling and exhibiting around the country. Dick and Cathy were at the annual Virginia Beach Hamfest. Dick reported that the facilities were very good as usual and attendance seemed up. He said that there was the usual concession food along with a "Roast Beef Bar" (sounds good). Roast beef was sliced off a large haunch for individual sandwiches while you waited.

Arnie and Peter didn't fare as well at Radio-Expo in Mundelein, Illinois. It was the usual "grease-dog" and mystery-meat victuals. This event has turned into a fleamarket rather than a hamfest with only a few commercial exhibitors showing up. It's a great fleamarket, but a questionable hamfest.

In early October we all went up to Boxboro, the big New England event. This time we were aided by Roy Gould, KT1N, who not only has time to head up our RTTY Contest, but also managed to take care of the commercial exhibits for the group putting on the hamfest. The Sheraton Boxboro has slipped considerably in both service and quality since the last hamfest there two years ago. The food, if you could get it, was not worth the effort, and trying to get it was another problem. Roy said that they are looking around for a new location for the next one. The fleamarket, although small, did have some interesting bargains, and I managed to get some small components to fix a few things I have at home.

I did get to the local LIMARC fleamarket, and as usual it had a lot to offer. There was an earlier mixup with the date for this event. After everyone published the date, they changed it to the following week. As it turned out, the location suddenly wasn't available on the scheduled date, hence the change. It's usually worth the effort to try to make this one.

There's one more to do before the end of the year, a local event. We'll let you know about that one next month when we announce the winner of the food award.

Season's Greetings

I hope the year has been good to you and that Santa fills your stockings with lots of goodies (actually, I was hoping for some bigger items). We here at *CQ* wish all of you and your families a very happy holiday season and the start of an even better new year.

73, Alan, K2EEK

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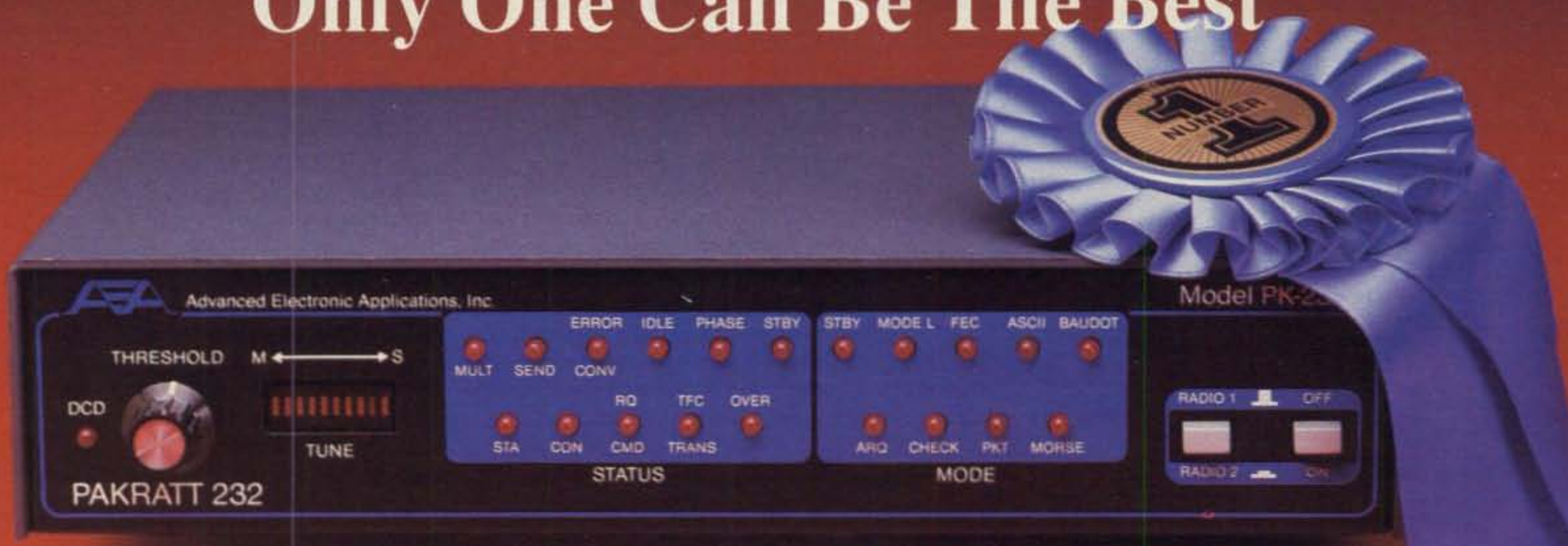

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• **Flamingo, Florida** - The Everglades ARC will operate W4SVI from 1400Z December 3 to 1900Z December 4 to celebrate the 41st anniversary of Everglades National Park. Operation on CW near 7030, 14030, and 21130 MHz and on SSB near 7230, 14230, 21330, and 28375 MHz. Novice contacts on 7130, 21130, and 28375 MHz. Send QSL and 2 unit stamps for unfolded certificate to: EARC, P.O. Box 113, Homestead, FL 33090-0113. Novice certificate for those who identify as Novices on two or three bands, no stamps required.

• **Apache Junction, Arizona Hamfest** - The 1988 ARRL Superstition Hamfest will be held on December 3–4 in Apache Junction, Arizona. Sponsored by the Superstition ARC, there will be free camping on grounds (no hookups) Friday and Saturday nights, with swap & shop on Saturday and Sunday. Tailgate admission $3.00, general admission $1.00 (covers both days). Primary talk-in on 147.12(+) repeater, and on the 145.41(−)/223.82(−) link system. Information can also be obtained on 146.74, 146.94, and ZIA system repeaters. For info call Bill Glaze, KA7SUF, at (602) 832-3955 or Larry Kuck, WB7CRK, at (602) 986-2298.

• **Hazel Park, Michigan** - The Hazel Park will hold its 23rd annual Swap and Shop on December 4 at the Hazel Park High School. General admission $2.00 in advance, $3.00 at the door. Children under 11 free. Tables $1.00 per foot. Plenty of free parking. Talk-in from the 9-mile and I-75 area on 146.640. Mail tickets and table reservations requests to HPARC, P.O. Box 368, Hazel Park, MI 48030.

• **Pelham, Alabama** - The Shelby County ARC will participate in the celebration of the 200th anniversary of the U.S. Constitution by operating AC200T December 10–16. This event will also celebrate the opening of the club station in Pelham, Alabama. AC200T is planning to operate all HF bands concentrating on CW and SSB. Other modes will be used if available. Special efforts will be made to contact Novices. All QSLs should include an SASE and be sent via W4DYL, 632 Glen Park Drive, Fairfield, AL 35064.

• **Burlington, Iowa** - The Iowa Radiosport Society will operate K200RW from December 17–23 in celebration of the Constitutional Bicentennial and the 150th anniversary of Burlington, Iowa as the first territorial capital. Operation will be on CW and SSB as propagation permits. Emphasis will be placed on the 10 meter, as well as other, Novice segments. For special QSL card send SASE or SAE and IRC to 923 N. 9th St., Burlington, IA 52601.

• **Albany, New York** - The ninth annual Number One Christmas Carol (N1CC) operation will be on Christmas Eve and Day (24–25 December in conjunction with the operation of the Albany ARA as K2 Christmas Tree (K2CT) on/about 1.850, 3.907, 7.238, 14.280, 21.365, and 28.480 MHz. Special QSL cards will be available for contacting either of the stations, with certificates for contacting both stations during the period. Send QSL with SASE to K2VV.

• **Garland, Texas** - The Garland ARC will operate K200QHD on CW, SSB, and Digital, 80–10 meters, from 0001Z December 24 through 2359Z December 30. For special QSL send your QSL and SASE to KF5PE, 2934 Cotton Gum Road, Garland, TX 75044.

• **Pasadena, California** - The Relay Repeater ARC will operate KG6AX from December 29 through January 2, 1600–0400Z each day, to commemorate the 100th anniversary of the Tournament of Roses. Suggested frequencies 3.885, 7.260, 14.260, 21.335, 28.550, and 28.450 Novice/Tech. For certificate send QSL and 9″ × 12″ SASE to Relay Repeater Club, P.O. Box 81, Arcadia, CA 91006-5019.

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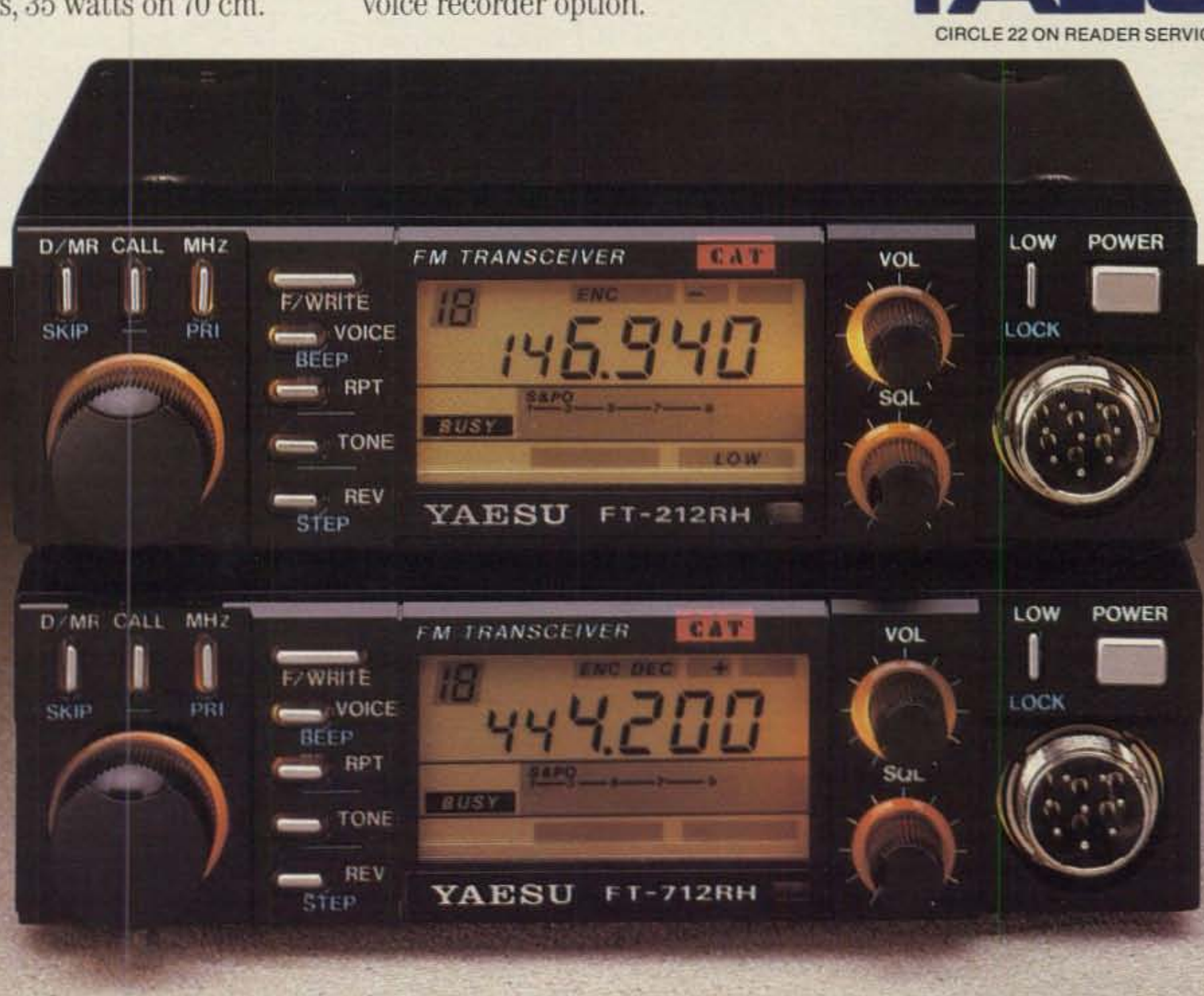

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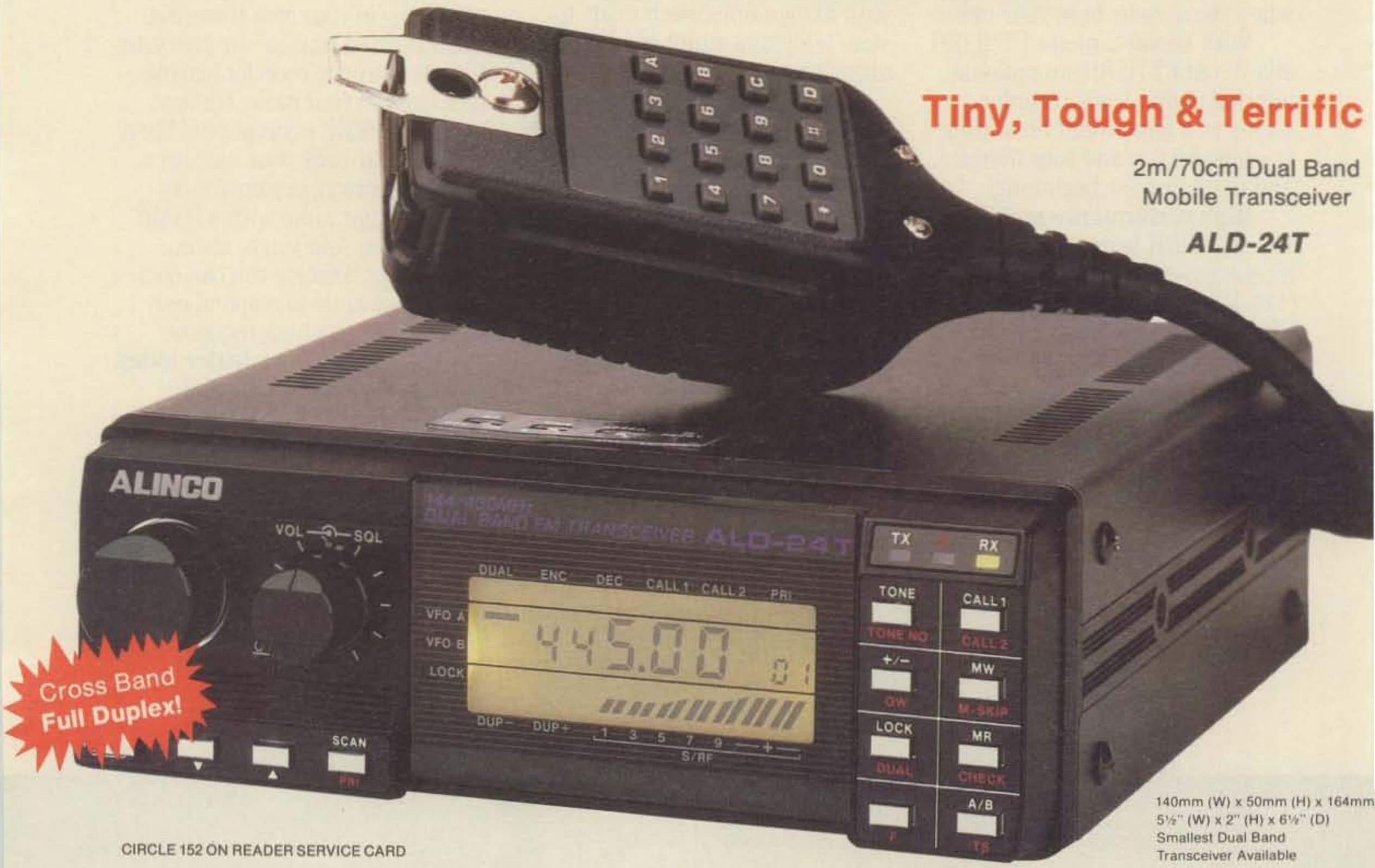

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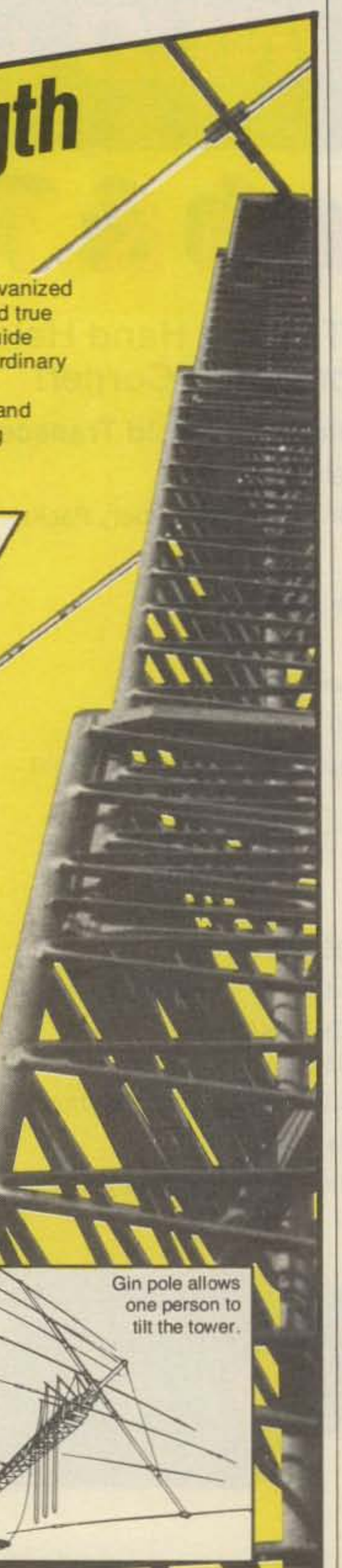

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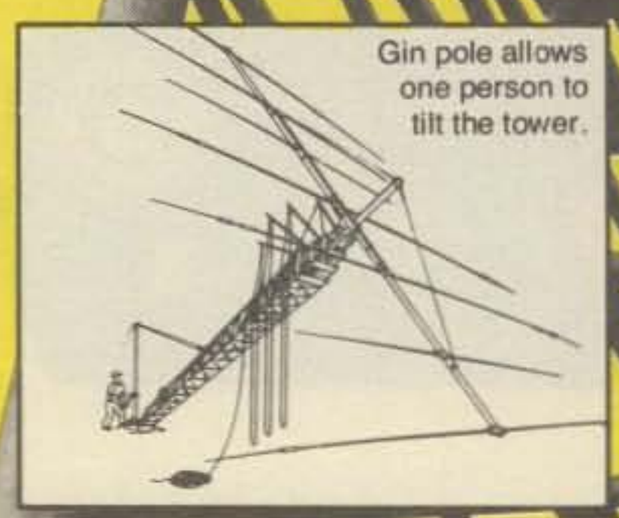

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Our Readers Say

Bill's Basics Correction

Editor, *CQ*:

Have just received my October 1988 issue of *CQ* and enjoyed reading the various articles. However, in "Bill's Basics" column, page 72, Table I, the Bahamas is listed as C5A instead of C6A, as it should be. It might confuse some newcomers.

Jim Robertson, C6AER
Nassau, Bahamas

More WW II Electronics, Please

Editor, *CQ*:

The Tonschreiber "b" article was absolutely fascinating (see July *CQ* page 29). How about more articles about WW II electronics?

James Berry, K7SLI
Portland, OR

Not Just A Contest

Editor, *CQ*:

Reading Larry Loen, N0HCQ's article (July 1988 issue) "Semi-Random Code Practice, A New Approach For Thirteen," reminded me about the method that I used for increasing code speed. Entering CW contests can increase your speed and country totals, and eliminate memorizing code tapes. *CQ* WW DX, European DX, *CQ* WW 160M, ARRL DX, and *CQ* WW WPX are all excellent opportunities.

Eric P. Hall, WD9GGY
Lansing, IL

Looking For Surplus

Editor, *CQ*:

I am a young collector of U.S. Army, English, and Canadian surplus radio sets. Because in Italy it is very difficult and more expensive to find good surplus, I would appreciate receiving catalogs and any other materials relating to surplus gear. Perhaps some of your readers could help me. Any information would be gratefully received.

Francesco Ginepra
Casella Postale 4138
I-16151 Sampierdarena Genova
Italy

"Ham" Is The Word

Editor, *CQ*:

I just got myself a TS-820S with a view to getting on 160 meters and will be trying out the W4TWW coaxial inverted L as published in *CQ* August 1984 issue. I am also considering feeding my quarter wavelength (for 80 meters) and seeing how that compares with the coaxial L.

Thanks for a really great magazine. Pity a lot of the events have already happened by the time it reaches South Africa. As a keen DXer, I would recommend your magazine to any like-minded radio amateur. (They're trying to wean us off the use of the word *ham*, but I'm afraid amateur radio to the uninitiated public is still *ham* radio! so much for the powers that be.) Details of antenna articles, DXpeditions, and of course those dream antenna farms—100 foot utility poles with a multitude of monobanders, and monster quads—are read with hunger (and envy!).

Craig Smith, ZS5AV
Mid-Illovo, South Africa

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A relatively inexpensive Radio Shack "Hi-Fi" audio device can find quite some versatile uses in the ham shack.

A Simple, Effective, Inexpensive Approach To Receive and/or Transmit Audio Equalization

BY JOHN J. SCHULTZ*, W4FA/SV0DX

The Radio Shack "Stereo Parametric Equalizer," catalog No. 32-1106, can be used "as is" for a variety of uses around the ham shack, or a very slight modification will allow it to become even more useful. The unit contains a wealth of electronics for a quite reasonable price tag of $39.95. (I have even seen it on sale for $10 less at some Radio Shack outlets.)

The unit is essentially just a super type of tone control. The feature that sets it apart from most garden-variety equalizers is that the center frequency of each of the three equalizer bands is independently variable. The unit is an obvious candidate for audio equalization or filtering applications on the transmit side (inserted in the microphone line) or on the receive side (inserted in the headphone line).

The Basic Unit

Table I shows the specifications for the unit, fig. 1 presents its front-panel layout, and fig. 2 presents a schematic of the unit. By looking at fig. 1, you can quickly see the features of the unit. The three slide controls on the left side of the unit are labeled LOW, MID, and HIGH. They can be used to boost (up to 12 dB) or attenuate (down to −12 dB) the center frequency as set by the rotary control knob above each slide control. The low range is 32 to 160 Hz, the middle range is 320 to 1600 Hz, and the high range is 3200 to 16,000 Hz. Between the use of the slide controls and the rotary controls you have a tremendous range of audio-shaping possibilities, which is not at all obvious from the few controls that are involved. The high range, 3200 to 16,000 Hz, borders on being totally useless for amateur radio applications, but the addition of one capacitor to the unit, as described later, will easily correct that situation. The other controls on the unit are simply a gain control and switches for in/out and on/off.

Fig. 2 presents a schematic for the unit, showing an impressive array of electronics inside. A few features might be of interest. Looking at the upper left-hand corner of fig. 2, note that transistors Q101 and Q103 are the input/output amplifiers for one audio channel. When the unit is switched out, Q101 simply feeds the input signal to Q103 via SW 101. When the unit is switched in, a bank of nine operational amplifiers is switched in between Q101 and Q103 for audio shaping.

The Radio Shack Stereo Parametric Equalizer.

It wouldn't be useful to go very deeply into the functions of each amplifier, but note that the ganged dual potentiometers (e.g., between the two sections of IC 101) control the center frequency of each frequency equalization band, while a fixed capacitor across pins 7 and 8 of each center amplifier (e.g., 2200 pF for IC 101) sets the frequency limits of each equalization band. The 3200 to 16,000 Hz equalization band is essentially controlled by the 22 pF capacitor across pins 7 and 8 of IC 105 and across pins 2 and 3 of IC 106. If 56 pF is *added across* those capacitors, the high range is brought down roughly to 1000 to 5000 Hz, which makes it extremely viable for amateur radio applications.

Locating IC 105 and IC 106 is not difficult when you have the schematic in hand (a copy is in the owner's manual which comes with the unit). IC 105, IC 109, and IC 106 are mounted, more or less in line, in the middle of the PC board between the slide controls VR 103 and VR 104. If you really get serious about wanting to modify the unit in other ways or otherwise want to experiment with the unit, Radio Shack has available an excellent service manual (Part No. 32-1106) for the unit which gives the complete PC board layout.

Some of the design and construction features of the unit rather amazed me as I experimented with it in my station. For instance, fig. 2 shows a generous use of bypass capacitors across the various transistors and ICs to make them RF immune. And, although the unit is housed in a

*c/o CQ magazine

plastic enclosure, a separate, internal cardboard-backed aluminum shield surrounds the single PC board inside the unit. I simply rate the construction of the unit as excellent. Unless you have an unusual station setup, there should be no problems with RF getting into the unit.

Transmit Applications

I experimented with the unit, using it directly in the microphone line between various dynamic microphones and the microphone input of a transceiver, and using shielded cables. No preamplifier is necessary, and in fact the unit seems to provide a bit of gain, although that is not indicated by the specifications.

Once the simple modification previously described was made, I found the various controls could be used to modify the sound of the several microphones tried in any desired manner from a bassy, mellow sound to an extremely crisp, penetrating sound. Of course, the sound that the person at the other end of the QSO hears depends upon the entire complex chain of audio shaping that takes place starting with your voice exciting the microphone and the other person's ears listening to a loudspeaker or headset. The bottom line is that on-the-air tests are the only way to finally adjust any equalizer. A good starting point with the Radio Shack unit (if modified) is to set the left-hand control at 160 Hz and its associated slide control at −12 dB, the middle control between 800 and 1600 Hz and its associated slide control at +3 dB, and the right-hand control at midrange and its slide control at 0 dB. Further adjustments mainly revolve around adjusting both middle controls and both right-hand controls in *small* steps. If you're after a "DX punch" type of sound, these adjustments usually will revolve around setting the frequency controls for slightly higher frequencies and the slide gain controls for values of +3 to +12 dB. The gain control is always used to keep the transceiver's ALC meter operating within its proper range.

Adjusting the equalizer can be a lot of fun if you have someone at the other end of the QSO who has the patience to enjoy a bit of experimentation. If things get a bit confusing, use the **EQ In/Bypass** switch on the unit to get back to a microphone's original sound. Opinions seem to differ as to the value of microphone equalization, but I've never heard of anyone who didn't consider it useful, unless by luck someone originally started out with the perfect microphone match for his or her voice. Even a few dB of signal intelligibility improvement comes at a bargain price by using equalization.

Initial experiments can be done by using batteries to power the Radio Shack unit. However, since the current drain is 40 ma, battery operation is not viable for

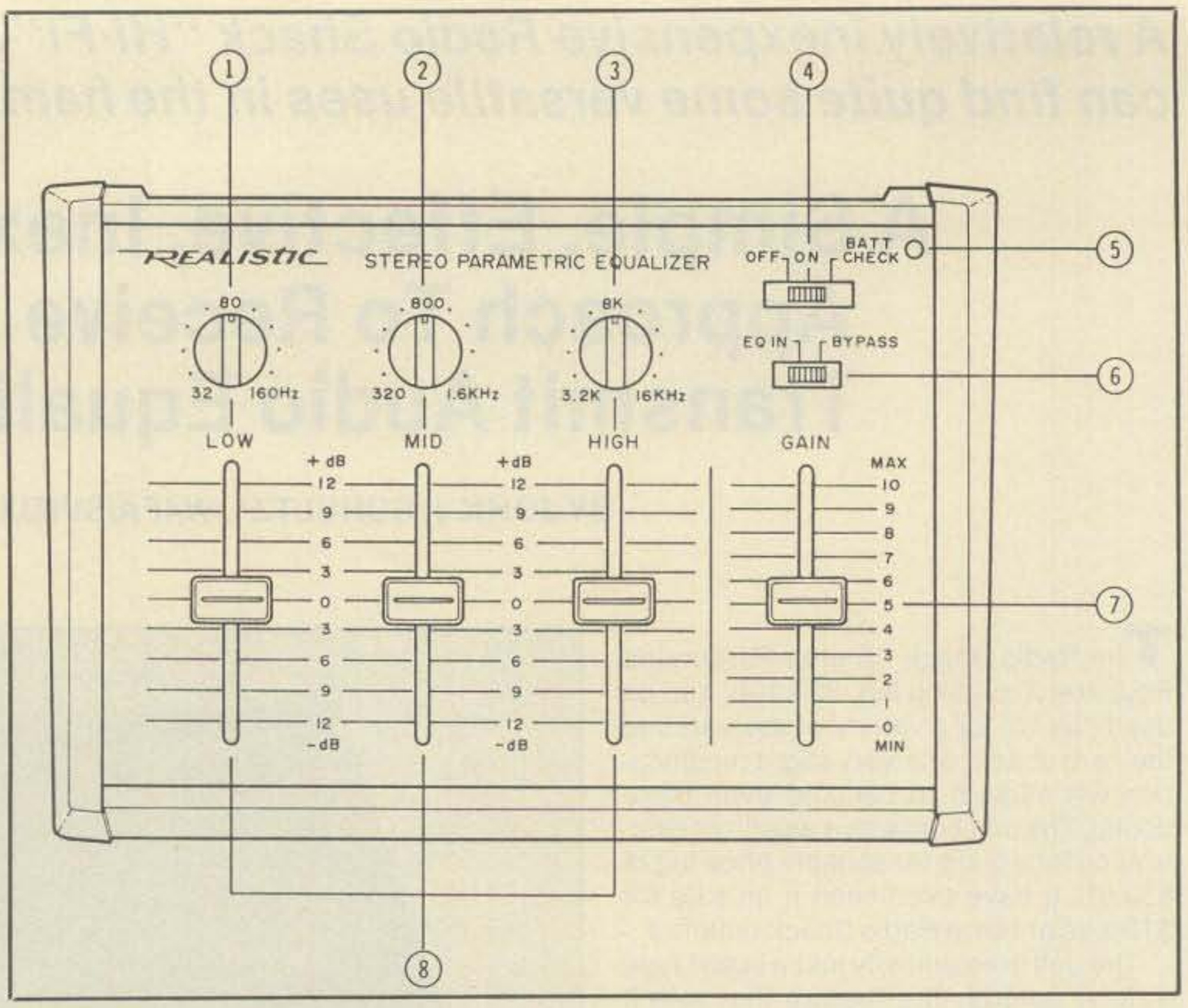

Fig. 1– Layout of controls on the top panel. Controls 1, 2, and 3 set the center frequency for each equalization band. The functions of the other controls should be obvious.

			Unit	Nominal
Frequency Response at 150 mv Output from 20 Hz to 20 kHz		20 Hz	dB	±1
		20 kHz	dB	±1
Control Frequency at 150 mv Output				
	80 Hz VR Min.	32 Hz	%	±10
	Center	80 Hz	%	±10
	Max.	160 Hz	%	±10
	800 Hz VR Min.	320 Hz	%	±10
	Center	800 Hz	%	±10
	Max.	1.6 kHz	%	±10
	8 kHz VR Min.	3.2 kHz	%	±10
	Center	8 kHz	%	±10
	Max.	16 kHz	%	±10
Control Range		Max.	dB	+13.5
		Min.	dB	−13.5
Harmonic Distortion at 150 mv Output from 20 Hz to 20 kHz			%	0.1
S/N Ratio at 150 mv Output (Input = 4.7K ohm Terminated, Output = A weighted)			dB	65
Dynamic Range at Output 1% THD (Gain VR Min)			V	10
Total Gain			dB	−0.5
Input Impedance			K ohm	50
Output Impedance			ohm	250
Current Drain			ma	40
Min. Operating Control (Battery) (THD 10% point)			V	4.5
Gain Control Range (from Max. to Min.)			dB	−20
Channel Separation at 1 kHz (Output 150 mv, 4.7K ohm Terminated)			dB	60
LED off voltage			V	6

Table I– Specifications of the Radio Shack Stereo Parametric Equalizer.

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High-performance package. Packing a solid 50-watt punch on 2 meters (40 watts on 70 cm), the FT-4700RH includes Dual-Band Watch for simultaneous monitoring of both bands, with independent squelch settings on the main and secondary bands. When you transmit, opposite band monitoring goes on in a full-duplex mode.

You can adjust the relative volume of the two receive channels with the balance control, too. And with Yaesu's bright LCD display, transceiver status is clearly visible in sunlight or shade.

Convenience on the road. Human engineering, long a Yaesu specialty, is an important aspect of the FT-4700RH design. The ten-button front panel keypad includes a "do-re-mi" audible command verification, and all important controls are backlit for night operation. Plus you get extended receive coverage of 140-174 MHz (MARS/CAP permit required for transmit on 140-150 MHz), or 430-450 MHz on 70 cm. Nine memory channels on each band. High/low power selection (low power: five watts). One-touch reverse repeater shift button. Optional CTCSS module. And 16-key DTMF microphone.

Optional accessories. FTS-8 CTCSS unit. MH-15D8 Autodialer Microphone with 10-telephone number memory. SP-3 or SP-4 External Speakers. And YH-1 Headset/Boom Mic or MF-1A3B Flex-Arm Boom Mic, both with SB-10 PTT Switch Unit.

Discover Yaesu's FT-4700RH today. And see what "high performance" really means. For dual-band mobile operation, Yaesu's FT-4700RH really fits!

FT-4700RH control head (1 15/16" x 5 7/8" x 1")

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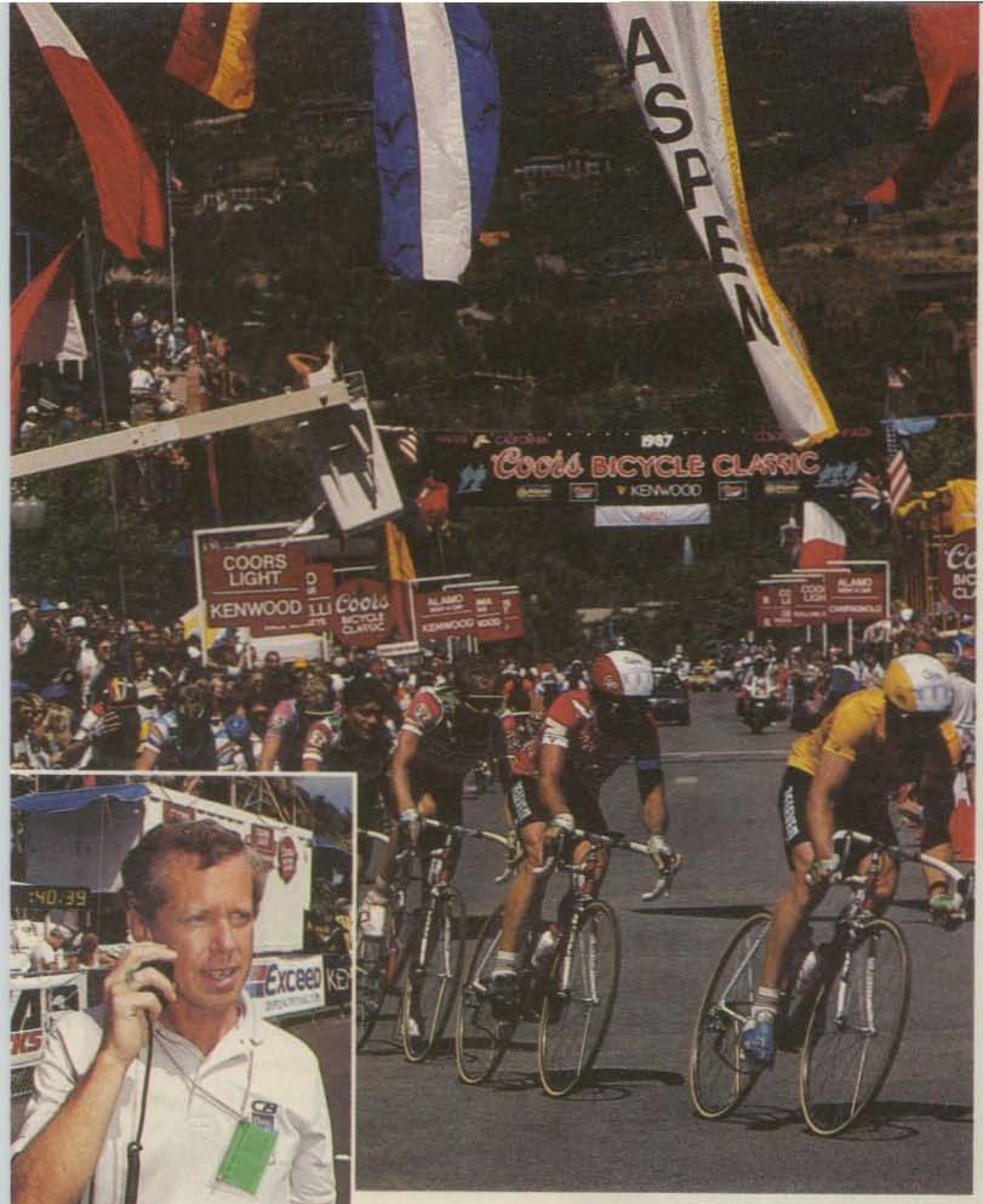
YAESU

CIRCLE 141 ON READER SERVICE CARD



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Rick Woodsome, Communications Consultant
Woodsome and Associates, Boulder, Colorado

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"Larsen antennas were instrumental in making last summer's Coors Classic an overwhelming success. They were key to our entire communication network.

"Without Larsen, it would have been uphill all the way."

Rick Woodsome

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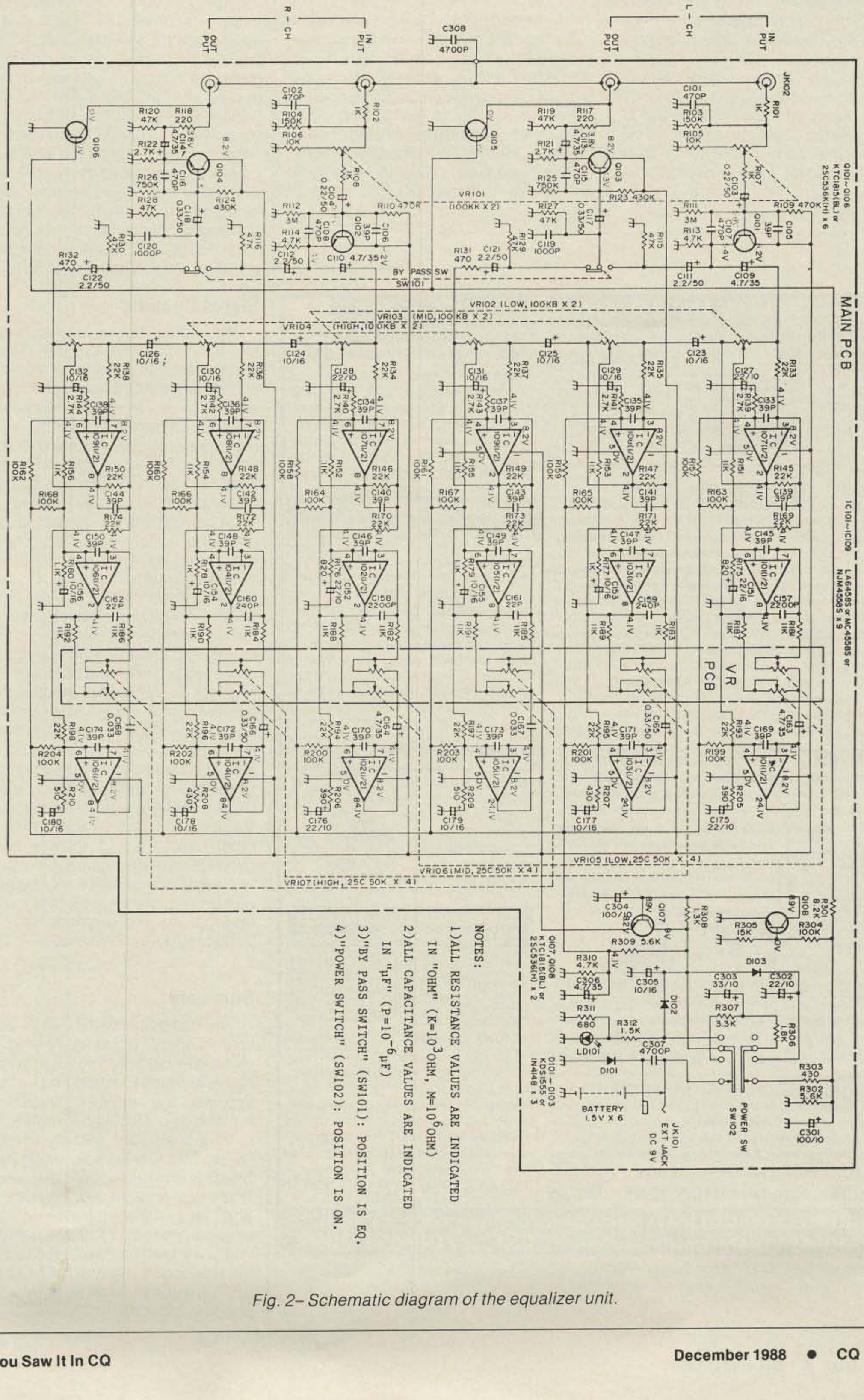
CIRCLE 151 ON READER SERVICE CARD



NOTES:

1)ALL RESISTANCE VALUES ARE INDICATED IN "OHM" (K=10^3OHM, M=10^6OHM)

2)ALL CAPACITANCE VALUES ARE INDICATED IN "μF" (P=10^{-6}μF)

3)"BY PASS SWITCH" (SW101): POSITION IS EQ.

4)"POWER SWITCH" (SW102): POSITION IS ON.

Fig. 2– Schematic diagram of the equalizer unit.

any extended period of time. A reasonably well-filtered 9 VDC supply is needed. Most plug-transformer types will suffice since the Radio Shack unit has additional on-board filtering.

The equalizer can be used as the core of a transceiver control unit, if desired. There is plenty of room to add a PTT switch on the top or very front panel of the unit, a volume control unit for a loudspeaker or headset, tune-up oscillator for SSB, etc.

Receive Applications

The equalizer can be inserted directly in the headphone line from a transceiver. The equalizer can provide only a very modest improvement in receive selectivity, but it can provide an amazing increase in the intelligibility of SSB signals which have muddy or bassy modulation. I came across numerous DX stations with "dull" modulation where I could only clearly understand parts of the QSO. The use of the equalizer didn't provide perfect copy, but the ability to control the frequency presence of specific portions of the voice band made for a tremendous increase in intelligibility. I can't quantify the improvement, but I'm sure I was saved many requests during QSOs for repeats of names, QTHs, etc. The simple tone controls which are present on some transceivers cannot equal the unit's performance. A slight side advantage to the use of the unit for receive applications using headphones is that the gain control on the unit functions as a volume control such that you don't have to constantly adjust the volume control on a transceiver.

Stereo Circuitry

The Radio Shack unit provides for stereo applications, but the various frequency and level controls control both channels simultaneously, and there is no easy way to separate them for each channel. Considering that the unit is so reasonably priced to start with, there is no great basis for complaint when considering amateur radio applications where only one channel is being used.

Of course, the thought does come to mind of connecting both the left and right channel equalizers in series in order to increase the effectiveness of the unit. Does such an idea work? Yes. It can be done simply by connecting the output of the left channel, for instance, to the input of the right channel, and taking the input of the left channel and output of the right channel as the overall input/output connection points. I found that such an interconnection scheme didn't prove to be particularly useful when the unit was being used as a microphone equalizer. The frequency shaping provided by the simple use of just one channel was more than sufficient for such an application. On the other hand, I would endorse the series connection of the channels if the unit is to be used in a receive-only application. Faster frequency roll-off is achieved and intelligibility improvement aspects are definitely more pronounced.

Summary

The Radio Shack unit can be used for a wide variety of audio-related experiments around a ham shack. For instance, I have a mobile station and am trying to improve the transmit audio through equalization. I would not want to have an outboard equalizer installed permanently, but I am temporarily using the Radio Shack unit to get the type of sound I want. Once that is achieved, I'll trace out the final equalizer response curve that worked best. Fixed, nonadjustable circuitry will then be developed to duplicate the response curve, but the fixed circuitry will be small enough to fit into a microphone enclosure. CQ

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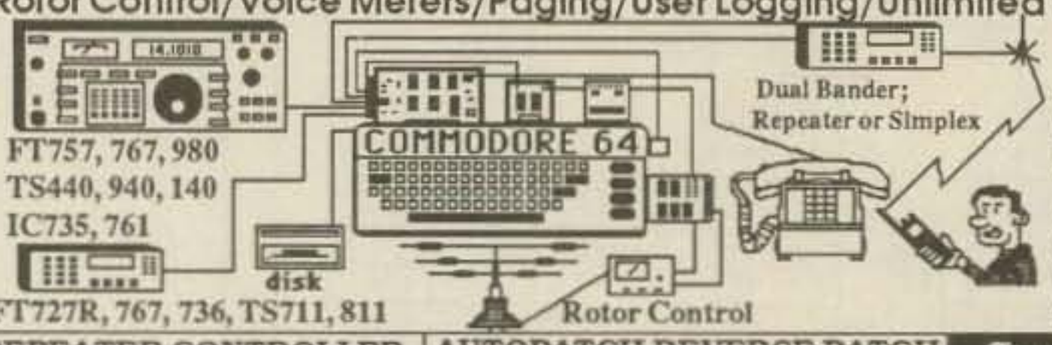

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- *CW Code practice & Voice
- *Talking meters; hi/lo alarm

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- *Voice ack. all commands
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- ***1020** (18 digit) tele. #'s stored
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- ***50 enable/disable tel.#'s**
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- ***Programable answer message**
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- *Security mode; T.Tone readback
- ***Reverse Patch active all modes**
- *Call waiting/Quick dial/auto off
- *Control via Patch/mem redial

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- *Dual VFO's/Rev/Split/COR
- *Set Scan inc. & offset/resume
- *Monitor mode & Link repeaters

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- *2 Voice Meter & Alarm inputs/8 On/off cont. /Packet.BBS..**PK8 $149.95**
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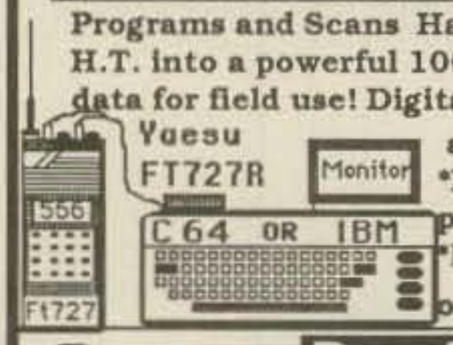

***Loads & programs all FT-727R parameters in less that 15 sec.**
*Includes hardware & disk for **C64 or IBM.** **Model 727 $39.95**

12 volt C64 SWITCHER
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- *70Khz 75% effecient
- *Outputs 5v.@2A & 9 VAC @ 60Hz
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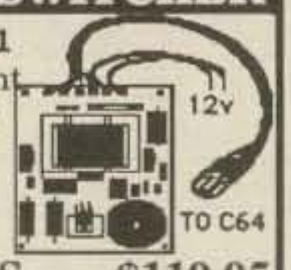
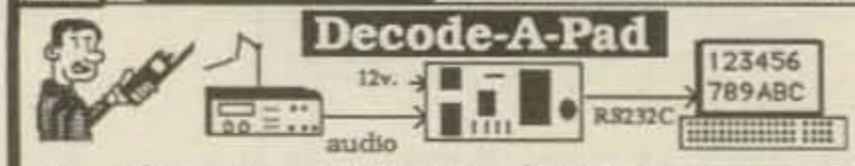


MODEL DCPS.....$119.95

Decode-A-Pad



Touchtone to RS232 (300 baud interface)
Program your computer in basic to decode multidigit "strings" sound alarms, **observe codes, includes basic program** for C64 VIC20;128; IBM. A must for repeaters. **"Decode-A-Pad"**
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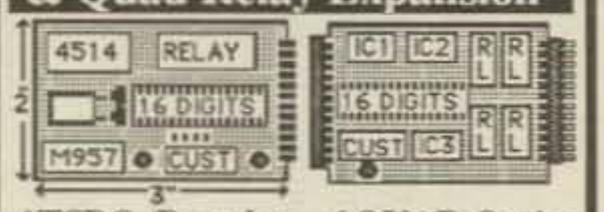
Touchtone 4 Digit Decoder & Quad Relay Expansion



*TSDQ Decoder ^QUAD Option
- *+8 to +20 V. supply; low power drain
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- *Momentary & Latching; DPDT relay
- *Wrong dig. reset;LED's digits+latch
- *24 Pin Conn. hook up & Expansion
- ^**Quad adds (4) DPDT 2A. Relays & individual 3 to 5 Digit on/off codes**
- ^Status outputs; wired & tested

TSDQ $79.95 QUAD $99.95
wired & tested

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Module installs inside the radio in 15 Min. Boost audio to 1 watt! Low standby drain/Corrects low audio/ **1000's of happy users.** Minature audio amplifier **Used by Police, Fire, Emergency, adds 40 dB gain!** for all H.T's when it needs to be LOUD!

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HM-36 Scanning hand microphone	47.00	
SP-20 Ext. speaker w/audio filter ..	149.00	139.95
FL-101 250 Hz 1st IF CW filter	73.50	
FL-53A 250 Hz 2nd IF CW filter	115.00	109.95
FL-102 6 kHz AM filter	59.00	
EX-310 Voice synthesizer.....	59.00	

IC-751A 9-band xcvr/.1-30 MHz rcvr	1699.00	1469
PS-35 Internal power supply	219.00	199.95
FL-32A 500 Hz CW filter (1st IF)....	69.00	
FL-63A 250 Hz CW filter (1st IF)....	59.00	
FL-52A 500 Hz CW filter (2nd IF)...	115.00	109.95
FL-53A 250 Hz CW filter (2nd IF)...	115.00	109.95
FL-33 AM filter.....	49.00	
FL-70 2.8 kHz wide SSB filter	59.00	
RC-10 External frequency controller	49.00	

IC-735 HF transceiver/SW rcvr/mic	1099.00	949.95
PS-55 External power supply.....	219.00	199.95
AT-150 Automatic antenna tuner ...	445.00	369.95
FL-32A 500 Hz CW filter	69.00	
EX-243 Electronic keyer unit	64.50	
UT-30 Tone encoder	18.50	

Other Accessories	Regular	SALE
IC-2KL 160-15m solid state amp w/ps	1999.00	1699
PS-15 20A external power supply.....	175.00	159.95
PS-30 Systems p/s w/cord, 6-pin plug	349.00	319.95
MB Mobile mount, 735/751A/761A...	25.99	
SP-3 External speaker	65.00	
SP-7 Small external speaker	51.99	
CR-64 High stab. ref. xtal for 751A....	79.00	
PP-1 Speaker/patch.....	179.00	164.95
SM-6 Desk microphone	47.95	
SM-8 Desk mic - two cables, Scan.....	89.00	
SM-10 Compressor/graph EQ, 8 pin mic	149.00	139.95
AT-100 100W 8-band auto. antenna tuner	445.00	389.95
AT-500 500W 9-band auto. antenna tuner	589.00	519.95
AH-2 8-band tuner w/mount & whip	659.00	589.95
AH-2A Antenna tuner system, only....	519.00	449.95
GC-5 World clock.....	91.95	79.95

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IC-275A 25W 2m FM/SSB/CW w/ps	1299.00	1069
IC-275H 100W 2m FM/SSB/CW	1399.00	1129
IC-375A 25W 220 FM/SSB/CW (c/o)	1399.00	899.95
IC-475A 25W 440 FM/SSB/CW w/ps	1399.00	1099
IC-475H 75W 440 FM/SSB/CW.....	1599.00	1289
IC-575A 25W 6/10m xcvr w/ps	1399.00	1129
IC-575H 100W 6/10m xcvr.....	1699.00	1499
IC-471H 75W 430-450MHz base (c/o)	1399.00	989.95
PS-35 Internal power supply	219.00	199.95
AG-35 Mast mounted preamp	99.95	
AG-35 (Purchased with IC-471H)	99.95	9.95
SM-6 Desk microphone	47.95	
EX-310 Voice synthesizer	59.00	
TS-32 CommSpec encode/decoder....	59.95	
UT-15 Encoder/decoder interface...	34.00	
UT-15S UT-15S w/TS-32 installed.....	96.00	

VHF/UHF/1.2 GHz Mobiles	Regular	SALE
IC-37A 25w 220 FM/TTP mic... (c/o)	499.00	349.95
IC-47A 25w 440 FM/TTP mic... (c/o)	549.00	399.95
PS-45 Compact 8A power supply...	145.00	134.95
UT-16/EX-388 Voice synthesizer ...	34.99	
SP-10 Slim-line external speaker ...	35.99	
IC-28A 25W 2m FM, TTP mic	469.00	409.95
IC-28H 45W 2m FM, TTP mic	499.00	439.95
IC-38A 25W 220 FM, TTP mic	489.00	349.95
IC-48A 25W 440-450 FM, regular mic	459.00	369.95
IC-48A 25W 440-450 FM, TTP mic....	509.00	449.95
HM-14 Extra TTP microphone	59.00	
UT-28 Digital code squelch.....	39.50	
UT-29 Tone squelch decoder	46.00	
HM-16 Speaker/microphone	34.00	
IC-228A 25W 2m FM/TTP scan mic...	509.00	449.95
IC-228H 45W 2m FM/TTP scan mic...	539.00	479.95
UT-40 Pocket beep function.....	45.00	
IC-900A Transceiver controller.....	639.00	569.95

★ Package Special . . .
IC-900A Transceiver controller with UX-29H 2m/45W and UX-39A 220/25W band units.
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UX-39A 220MHz 25W band unit....	349.00	289.95
UX-49A 440MHz 25W band unit....	349.00	319.95
UX-59A 6m 10W unit	349.00	319.95
UX-129A 1.2GHz 10W band unit ...	549.00	499.95
IC-1200A 10W 1.2GHz FM Mobile.....	699.00	549.95
IC-3200A 25W 2m/440 FM/TTP (c/o)	695.00	499.95
UT-23 Voice synthesizer.....	34.99	
IC-3210A 25w 2m/440 FM/TTP	739.00	649.95
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AHB-32 Trunk-lip mount	35.00	
Larsen PO-K Roof mount	20.00	
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RP-2210 220MHz 25W repeater	1649.00	1469
RP-3010 440MHz 10W FM repeater...	1299.00	1149

Due to the size of the ICOM product line, some accessory items are not listed. If you have a question, please call. All prices shown are subject to change without notice.

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Hand-helds	Regular	SALE
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IC-4AT 440 MHz, TTP	349.00	299.95
IC-02AT/High Power	409.00	349.95
IC-03AT for 220 MHz	449.00	289.95
IC-04AT for 440 MHz	449.00	389.95
IC-u2AT for 2m w/TTP	329.00	289.95
IC-u4AT 440 MHz, TTP	369.00	299.95
IC-2GAT for 2m, TTP	429.00	379.95
IC-4GAT 440MHz, TTP	449.00	399.95
IC-32AT 2m/440MHz	629.00	559.95

IC-u2A for 2m w/o TTP
Reg. $299 - **Closeout $249.95**

IC-12AT 1W 1.2GHz FM HT/batt/cgr/TTP	473.00	369.95
IC-12GAT Dlx 1/7W 1.2GHz FM HT/TTP	529.00	469.95

Aircraft band handhelds	Regular	SALE
A-2 5W PEP synth. aircraft HT.....	525.00	479.95
A-20 Synth. aircraft HT w/VOR.....	625.00	569.95

Accessories for all except micros	Regular
BP-7 425mah/13.2V Nicad Pak - use BC-35	79.00
BP-8 800mah/8.4V Nicad Pak - use BC-35...	79.00
BC-35 Drop in desk charger for all batteries	79.00
BC-16U Wall charger for BP7/BP8.....	21.25
LC-11 Vinyl case for Dlx using BP-3	20.50
LC-14 Vinyl case for Dlx using BP-7/8	20.50
LC-02AT Leather case for Dlx models w/BP-7/8	54.50

Accessories for IC and IC-O series	Regular
BP-2 425mah/7.2V Nicad Pak - use BC35....	49.00
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BP-4 Alkaline battery case.....	16.00
BP-5 425mah/10.8V Nicad Pak - use BC35	65.00
CA-5 5/8-wave telescoping 2m antenna	19.95
CP-1 Cig. lighter plug/cord for BP3 or Dlx....	13.65
CP-10 Battery separation cable w/clip.....	22.50
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HS-10SA Vox unit for HS-10 & Deluxe only	24.50
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Receivers	Regular	SALE
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FL-63A 250 Hz CW filter (1st IF)	59.00	
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EX-257 FM unit.....	49.00	
EX-310 Voice synthesizer	59.00	
CR-64 High stability oscillator xtal	79.00	
SP-3 External speaker.....	65.00	
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Results of the 1988 CQ 160 Meter CW and Phone DX Contests

BY DONALD McCLENON*, N4IN

The West German 160 meter enthusiasts. Of this group, the following operators participated in the 1988 contest: DJ2YA, DJ8WL, DK2WH, DK4AN, DK7PE, DL1RK, DL7MAE, DL8AN, DL8GBH, and DL8NBE.

This year CW conditions were good over most of the world both nights. First night phone conditions were about the same. Second night phone varied from disaster in the southeast USA to high static levels well out of that area. DX stations thought the entire W/VE population had tin ears.

There were 4094 valid CW calls recorded, and 4699 on phone. This is a few hundred more on CW and about the same number less on phone than last year. Second night phone conditions probably account for its decrease. There were 123 countries active on CW and 104 on phone. We always have some jokers in the deck, and this year even a few seasoned operators actually included one or more of the following in their logs: SL1M, UB4OM, and some we can't mention here!

All 50 states were on in both modes, and all provinces but VO2 and VE8/VY. Alaska was so rare on phone that no one claimed WAS. To tantalize everyone there were five KL7's operating portable in the U.S. The few who worked W6YMR/KL7 were lacking other states. On CW the following worked all 50 states: AA1K, AF9Y, K2EK, K4PI, K5MM/7, K5NA, K9UWA, K0PK, KC5DX, KS9O, N4IN, N4RJ, N9NB, N0TT, W3LPL, W3QM, W4RX, W9AZ, W9RE, W9UP, W0AIH, and W0ZV.

We received 627 CW and 288 phone logs for a total of 915. If you think it's too much trouble to send in your small log, don't fret when someone from your area gets a certificate with a score far below yours.

*3075 Florida Ave., Melbourne, FL 32904

CW Contest—January

Most of these prefixes would be considered good catches from the 123 countries reported: A4, C6, CE, CT3, EA6, EA8, EA9, FK8, FO0, FT5, GD, GJ, GU, HC, HL, HZ, IS, IT, J3, J5, J7, J8, JD, JT, KG4, KH2, LU, LX, OA, OH0, OJ0, OX, OY, PZ, SV, SV5, SV9, TA, TF, TG, TK, UD, UH, UI, UJ, UM, V4, VK9, VP2E, VP5, VS6, VU, YB, YJ, ZB, ZS, 3B8, 4S, 5B, 9H, 9M, and 9Y.

The following number of active stations were reported from each country having over ten:

Country	Station	Country	Stations
W	1693	OE	20
UA	356	SP	18
UB	283	UP	17
OK	242	OZ	16
DL	167	ON	15
G	150	SM	15
UA9	116	SV	15
JA	115	UL	21
VE	87	GM	12
OH	72	UC	12
YU	67	EA	10
Y	50	F	10
LZ	43	UA2	10
UQ	41	VK	10
I	39	Others	282
HB	37	Total	4094
PA	31		
UR	22		

Jeffrey Briggs, K1ZM, operated NP4A again this year for a world-high 870,492 score. This is a bit higher than his own last year's record. Second world high was last year's top European, ON4UN, at 427,242. They were followed by VE6OU/3 at 404,670, KP2A (W4TEA) at 376,053, KM1H (KQ2M op.) 364,302, K2EK 352,833, YT2R* 347,225, I2UIY* 339,553, HG9R* 325,212, AA1K 321,963, W0ZV 313,446, OK5TOP* 309,894, and K5NA 305,292 (asterisks denote multi-op stations). These scores run considerably higher than last year. Top 10 scores in the W/VE Single Operator, DX Single Operator, and World-Wide Multi-Operator categories are shown in the score boxes.

QSO leaders were NP4A 1034, AA1K 925, K2EK 923, K5NA 894, KM1H 893, W0ZV 856, W3LPL 829, W0AIH 817, VE6OU/3 at 809, and W9AZ 804. Outside W/VE, QSO leaders were NP4A 1034, ON4UN 720, KP2A 644, OH1AF 564, RU1DZ 562, 4N4Y 496, Y33VL 492, UQ2GKL 464, UP3BO 455, UP2PQ 452, and CT1AOZ 412. High contact totals outside NA/EU were UG6GAW 411, PJ9J 361, 4X4NJ 357, HK1AMW 337, UA9FAR 335, and KH6CC 321.

NP4A was again the world multiplier leader with 129, four less than last time. He was followed by KM1H 111, K2EK 109, AA1K 107, KP2A 103, N4IN 103, K5NA 103, W3BGN 103, N4RJ 103, W0ZV 102, NY2L 101, and W3LPL

W0CEM hung wire antennas from the tower and also used the 80 foot top-loaded irrigation pipe vertical in the background. It has an extensive ground system.

Say You Saw It In CQ

100. DX multiplier leaders not shown above were ON4UN 93, OK5TOP 87, I2UIY 83, UR1RWX 83, HG9R 82, G3XTT 81, CT1AOZ 80, OK3CQW 79, OK3KAP 78, and PAØERA 78.

Countries-worked leaders were NP4A 74, ON4UN 62, OK5TOP 59, HG9R 58, 4X4NJ 58, UR1RWX 57, 4N4Y 57, KM1H 56, LZ9A 56, OH2HE 56, YT2R 56, YT3T 56, G3XTT 55, OK3KAP 55, UR2RYY 55, and Y33VL 55. W/VE country leaders were KM1H 56, AA1K 54, K2EK 54, W3BGN 48, N4IN 48, N4RJ 48, NY2L 47, K5NA 47, WØZV 47, W3LPL 45, and K1TO 43.

World, USA, and continental leaders for both modes will receive plaques as shown in the plaques box. Because a plaque winner cannot receive the same plaque two years in a row, a runner-up may be shown this time. Sponsors for each plaque are indicated. They contribute a lot to improve participation and enjoyment of the contest. Single and multi-op winners in each state, province, and country will receive *CQ* certificates.

Many people now run their logs through a computer to check all the dupes, which is greatly appreciated. Too many work the same station twice, but get the call wrong one of the two times. The computer likes both calls. Here are some that were caught and verified as dupes:

DLØKDE = DLØKB	NØTUA = NØXA
DL6RL = DL6RAI	NA2MA = NA2Q
G3YG = G3TWG	WA4ASN = WA4EBN
K1NV = K1TEV	PA3AMA = PA3AQ
K2ATI = K2WI	TA1CT = TA1KA
KA1WEE = KA1PE	UL7PNI = UL7ACI
N2NMA = N2NQ	UL7WRI = UL7ACI

Some big logs were sampled to see what maximum QSO-per-hour rates were obtained. Usually it's in the first three hours. Some of the highest in their best full-hour period were NP4A 102, SV1NA 98, K8LX 94, W9RE 90, UQ2GKL 90, UQ1GWW 88, WØAIH 87, W9AZ 84, K4XU 81, NØTT 80, and RU1DZ 80.

If there is such a thing as the "Most Valuable Player" in the CW contest, John Crovelli, W2GD is the man. He worked with OH2BU to organize and man the "Market Reef Winter DXpedition" using the call OHØMB/OJØ. Many people throughout the world are indebted to them for a new country.

Saturday morning on Market Reef W2GD fell and dislocated his sending-hand shoulder. He was air lifted by the Finnish Coast Guard to a hospital on Aaland Island for treatment. When they let him out of the hospital, he put up a 125 foot wire 15 feet above ground, wound a loading coil on a plastic bottle, and got on 160 to put OHØ on the air. He worked 66 people, sending and writing with the wrong hand. He even got UA9 and UM8. He heard lots of W/VE, but couldn't raise any.

While all this was going on, his home station was being operated by friends multi-op to the tune of 187,889 points! Who else could have three stations in three countries running on the same weekend?

Phone Contest—February

Everything seemed to be going well the first night. There was lots of activity and quite a bit of DX for the better-equipped stations. Then it was all over if you were in southeast USA. The second night static was so bad that not even local calls could be identified. It stayed that way all night long. In other parts of the country operation was possible, but contact rates were down and little DX was worked. The Europeans continued working each other much as usual.

N6AW operating W6AM. He was at home, not here, for the CW contest, when he made third high in California.

For W/VE the following active prefixes were good multipliers from the reported 104 countries: A9, C3, CP, CU, CT3, D4, EA6, EA8, FT, GJ, GU, HC, HC8, HH, HKØ, HP, HR, H44, IS, IT, J3, J5, J7, KH9, KX6, LA, LU, LX, PJ, P4, SU, SV, SV5, TA, TG, UD, UF, UH, UI, UJ, UM, V3, VK9, VP2E, VU, VS6, ZS, 4X, 5B4, 7X, 8R1, 9H, and 9Y.

The following number of active stations were reported from each country having 10 or more participants:

Country	Stations	Country	Stations
W	2084	DL	20
UB	824	YU	19
UA	716	EA	16
UA9	158	PA	16
VE	116	UO	14
G	84	OH	13
UC	62	LZ	13
I	60	F	12
UQ	40	SP	11
OE	38	Y	11
UL	29	ZL	11
OK	27	UI	10
UP	27	UA2	10
VK	27	UD	10
HB	23	Others	177
UF	21	Total	4699

Robert Grigorian, UG6GAW, had fourth world-high phone score last year as a single operator. This year he teamed up with two others and produced the top world score of 354,144 using the multi-op call UG7GWO* (asterisks again denote multi-ops); 92% of all their QSOs were 10-pointers. The second world high score of 294,500 was made by David Rosen, K2GM, operating 4U1UN. Jerry Rosalius, WB9HAD, was third world high with the largest USA score of 261,079. Next in order were VX3XN 207,746, LZ9A* 204,450, UL7ACI 184,418, OK7MM* 168,700, NØXA* 160,965, K5NA* 160,056, K3TUP* 156,436, WA2UUK 149,250, VE3PN 140,479, W9UP (NØBSH op.) 139,360, K3KG* 137,256, and KR9S* 131,580. Top 10 scores in the W/VE Single Operator, DX Single Operator, and world-wide Multi-Operator are shown in the score boxes.

World high QSO leader was WB9HAD with 1189, a few less than last year, but amazing with the terrible conditions that second night. Next were NØXA 969, W9UP 908, K3TUP 903, UG7GWO 880, K5NA 859, KR9S 854, WA2UUK 828, K3KG 794, AF9Y 775, LZ9A 763, and N4RJ 742. Outside W/VE high contact totals were UG7GWO 880, LZ9A 763, OK7MM 643, UP1BYL 533, UZ6AXE 528, UL7ACI 477, UC2IDC 412, and UO5ONQ 385. Outside NA/EU contact leaders were UG7GWO 880, UL7ACI 477, UA9MR 169, RF6FIL 142, and HK4DUM 116.

Again this year WB9HAD was far ahead of everyone else in the multiplier department with 91. He was followed by K3KG 76, K5NA 76, WA2UUK 75, W3BGN 75, KF4HK 75, K3TUP 74, NØXA 73, N4RJ 72, and VX3XN 71. DX multiplier leaders not shown above were YT2R 63, YU4BR 62, HK4DUM 58, YU2T 57, I8CZW 54, LZ9A 50, OK7MM 50, and XE1VIC 50.

YT2R led the country parade with 54. Next in order were YU4BR 48, I8CZW 47, YU2TW 47, LZ9A 45, OK7MM 44, OK3CQW 41, OK1DFP 40. W/VE country leaders were WB9HAD 36, K3KG 24, W3BGN 24, K3TUP 22, K5NA 22, AA4MM 21, KF4HK 21, NØXA 20, N4RJ 19, and WB2P 19. All country totals were down from last year, and we thought that was bad!

High-speed artists with the following QSO/hour rates for a selected best full hour were: AA1K 133, W9RE 122, AF9Y 111, K3ZO 109, and WB9HAD 102.

Sponsors and trophy winners for various

Fourth World-High Phone scorer VX3XN shown in a quiet moment not found during the contest. This was a single operator achievement.

categories are shown in the special plaques box. Single and multi-op winners in each state, province, and country will receive *CQ* certificates.

Advice for Contestants

- Be sure each call is legible by someone who does not know your handwriting. Be sure we can tell the difference between D and O, H and M, U and V, W and N. If you copy the log, proofread the copy for errors. They will cost you points.
- No more than 50 QSOs per page.
- No sheets with writing on both sides.
- Tear fan-folded logs into separate sheets, put in order, and staple together. Write calls written on folds on either adjacent page.
- Show state, province, or prefix for each call, even if not a multiplier. Otherwise you get no credit for it.
- Be sure your name and address are on the log and are readable.
- Check with the post office to be sure you have enough stamps on the envelope.
- If you want assurance that your log has arrived okay, include a self-addressed, stamped card. It's cheaper than a return receipt from the P.O.

Club Competition

This category keeps getting more popular, and it sure boosts activity, which makes everyone enjoy the contest more. There are no special awards, and no restrictions on how many entries you need; it is just for fun. The Yankee Clipper Contest Club got tired of running second and surged up to first place. The Frankford Radio Club was extremely close in second place, with the Southeastern DX Club not far behind. All three topped the 2 million point mark. Three other clubs were over 1 million. A record number of 80 clubs submitted scores.

Next Time

The CW contest will be held the last full weekend of January 1989 (January 27, 28, 29), and the Phone contest will be held the last full weekend of February (February 24, 25, 26). Times for both are 2200Z Friday to 1600Z Sunday.

Send your business-size SASE to *CQ*, 76 North Broadway, Hicksville, NY 11801 with enough postage for the summary and log sheets you plan to use. You can photocopy sheets or make up your own, 40 QSOs per page, with Universal Time (Z), station, info sent and received, sequentially numbered multipliers as each is first worked, and claimed points. Indicate all zero point dupes, but leave them in for cross-checking. There is no penalty for marked dupes. Include a summary sheet showing your name, address, call, and state, province, or country of operation.

CW mailing dealine is February 28, and March 31 for phone. Send logs to 160 Meter Contest Director Don McClenon, N4IN, 3075 Florida Ave., Melbourne, FL 32904 USA. Logs may also be sent to *CQ*. Please indicate CW or Phone on the envelope. Send in good photos of yourself and setup. Photos may be sent well after log deadlines.

Hope you will be in both 1989 contests.

73, Don, N4IN

Soapbox W/VE CW

Started my 60th year on the air with this contest. The gang seemed more disciplined this year than in the past . . . *W1PL*. A perfect contest for QRP operation; good conditions and lots of good operators . . . *KN1H*. High wind blew a tree into the power line, creating hash for several hours Sunday morning. Lucky to keep power and work KL7 through it . . . *K2EK*. All 50 states in one weekend . . . *W2GD*. Stations who take up 5 kHz of the band with phase noise should be put in the multi-*transmitter* class . . . *AA1K*. Missed Japan as he sent K4PS?, K4PH? while fading into the noise . . . *K4PI*. Farmers love this contest. It always produces a weather front with rain and QRN on Saturday night . . . *WB5KYK*. YT2R and ON4UN answered my first call. I know it's going to be like this in heaven . . . *WM5K*. Very impressed with European sunrise signals . . . *AF9Y*. Best contest conditions ever heard on 160 . . . *VE6OU/3*. Operators were very courteous. You don't hear "QRL?" in any other contest prior to a string of CQ's . . . *VX3CUI*. We introduced several non-CW types to a very exciting form of contesting. It's great. Keep it up! . . . *W0BXR*.

Soapbox DX CW

In five months KX6DC went from Novice to Extra class. I got him interested in 160 and he made nearly 84,000 points using a straight key! . . . *KX6DS*. This contest brings them out of the woodwork. Then they hibernate for the rest of the year . . . *G4BYG/A*. Where were all those W5's, W7's, and thousands of Russians? Anyhow, will look for them again next year . . . *CT1AOZ*. My antenna was cut down by somebody while I was sleeping Saturday . . . *DL1VJ/A*. Impossible to copy most signals in my summer noise. Hope better condx next time . . . *LU2E*. Now have 12 Beverages, one every 30 degrees, averaging about 1000 ft. Second night by far the best . . . *ON4UN*. Second night lightning damaged my radio . . . *PY8CL*. Rare countries/states should CQ much more. It's frustrating to hear European big guns being called by rare multipliers W0EJ, N0XA, N4NO, RI8OA, etc. . . . *DL6RAI*. We could hear US stations until 0800Z, but they

TROPHY WINNERS

Single Operator
CW

World by K5AAD: Winner John Devoldere, **ON4UN** (The David E. Busick, N5JJ Memorial).
U.S.A. by K4TEA: Winner Carl W. Huether, **KM1H** (KQ2M Op.).
Europe by K4UEE: Winner Jose M.S. Albuquerque, **CT1AOZ.**
Africa by K4SB: No entrant.
Asia by WD4RCO: Winner Riki Kline, **4X4NJ.**
Oceania by K4JAG: Winner Jack Wheeler, **KH6CC.**
South America by K4TKM: Winner John H. Thompson, **PJ9J.**

Phone

World by K5AAD: Winner United Nations Amateur Radio Club, **4U1UN** (K2GM Op.) (The David E. Busick, N5JJ Memorial).
U.S.A. by K4JRB: Winner Jerry W. Rosalius, **WB9HAD.**
Africa by WB4ZNH: Winner Luis M.P. Gomes, **CT3DL.**
Europe by N4NX: Winner Edo Koljatic, **YU2TW.**
Oceania by K4DLI & KB4SSS: Winner John Hultquist, **K6GSS/KH6.**

Multi-Operator
CW

World by N4RJ: Winner Radio Klub RTV Zagreb, **YT2R.**

Phone

World by Southeastern DX Club: Winner Robert Grigorian, **UG7GWO.**

Say You Saw It In CQ

Radio Shack Presents Its All-New 10-Meter Mobile SSB/CW Transceiver

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CIRCLE 68 ON READER SERVICE CARD

TOP 10 SCORES

Top 10 W/VE Single Op. CW		Top 10 W/VE Single Op. Phone	
VE6OU/3	404,670	WB9HAD	261,079
KM1H	364,302	VX3XN	207,746
	(KQ2M Op.)	WA2UUK	149,250
K2EK	352,833	VE3PN	140,479
AA1K	321,963	W9UP	139,360
W0ZV	313,446		(N0BSH Op.)
K5NA	305,292	AF9Y	115,977
VE3BVD	286,982	W3BGN	108,675
W3LPL	249,200	WZ4F	103,776
	(KE9A Op.)	KF4HK	96,000
K1TO	245,798		
VO1MP	221,848		

Top 10 DX Single Op. CW		Top 10 DX Single Op. Phone	
NP4A	870,492	4U1UN	294,500
	(K1ZM Op.)		(K2GM Op.)
ON4UN	427,242	UL7ACI	184,418
KP2A	376,053	YU2TW	72,276
PJ9J	253,825	YU4BR	67,208
UG6GAW	250,932	UO5ONQ	65,340
4X4NJ	248,048	UC2IDC	59,508
CT1AOZ	247,360	OK1DFP	45,064
HK1AMW	243,017	RF6FIL	42,834
OH1AF	241,272	OK3CQW	40,656
	(OH1NOA Op.)	LZ1KVZ	38,280
RU1DZ	220,710		(LZ1F-194 Op.)

Top 10 Multi-Op. CW		Top 10 Multi-Op. Phone	
YT2R	347,225	UG7GWO	354,144
I2UIY	339,553	LZ9A	204,450
HG9R	325,212	OK7MM	168,700
OK5TOP	309,894	N0XA	160,965
UR1RWX	277,469	K5NA	160,056
W3BGN	274,598	K3TUP	156,436
OH2HE	261,338	K3KG	137,256
OK3KAP	259,272	KR9S	131,580
OH0MB/OJ0	253,595	N4RJ	118,296
PA0ERA	253,500	VE3FKK	117,315

couldn't hear us; probably QRM there . . . *PA0ERA*. Contesting very different from this part of the world. Glad to give a new country to many . . . *W2GD (Opr. at OH0MB/OJ0)*.

Soapbox W/VE Phone

Getting too old for this. I like to think of myself as middle-aged, but I don't know of anyone who is 144! . . . *W8GDQ*. We got no answers when our sleepy operator called "CQ SS." . . . *W0CEM*. Exciting to have a run of VK's Saturday morning . . . *W9UP*. QRM bad the first night, QRN the second . . . *WB9HAD*. Wife OK'd new antennas; neighbors didn't. Had only one left at end of contest . . . *WC7S*. Boy that second phone night was a bummer! No one on the east coast could hear any of us out west in all that QRN . . . *N4ARO/6*. Had to quit several times due to FCC-authorized power-line noise . . . *KN5S*. A voice from heaven mentioned the W6YMR/KL7 multiplier at 4 AM Sunday, but we decided not to take advantage of the devine assistance . . . *WD5R*. As a YL hanging off my tower installing the 160 antenna, got the neighbors a little excited. The thrill was, it worked! . . . *KL7JAR/W4*.

Soapbox DX Phone

It's fun to work a contest with no beam to rotate . . . *K6GSS/KH6*. Are conditions always this bad for the SSB test? . . . *G0FDX*. Super high noise. Three QSOs in 3 hours . . . *HK4DUM*. Even the big guns had trouble in the 4U1UN pileup . . . *I0KHP*. Thrill to work OK7MM and YU4BR, the only Europeans heard . . . *ZL2SQ*. CW test much better here . . . *KX6DC*. Good pileups of Russians . . . *LZ9A*.

CW Multi-Op Station Crews

KY1H & KB1W, N1EMG. **KI1G** & K1NG, KD2SX. **W1OP:** K1DT, KA1KWE, N1AKO, W1GS, WA1JHV, WA1TAQ, Dan. **K2WI** & N2NU, WA2IUO. **WB3JRU** & KC3AJ, packet. **W3BGN** & W2REH. **W3GM** & KZ2R, N2EA. **K3WW** & Net. **K3ND** & Net. **N3BNA** & NB3I. **K3NZ** & Net. **N4RJ** & KM9P. **NQ4I** & K4XR, WI4R. **WB4GNT** & Net. **K4UEE** & Net. **K0HLB** & W0MHS. **N4UZ** & Net. **WA4VDE** & Net. **N4XM** & KD4U. **N4AR** & Net. **K4CNW** & KX4H. **KC5DX** & AA5DX. **N6DX** & AD6C, N6VR. **WB6EGE:** KA6OPN, N6MQ, N6QC, WB6WPO. **K7QQ** & K7SS. **KR7G:** K7CW, K7LKC, KT7G. **W7AWA** & Net. **K7IDX** & Net. **K8CC** & KE8OC, KN8S. **W8CD** & K8GG, W8UVZ. **K8LX** & N8EA. **K8AQM** & K8JM, NI8L, WA8VMS. **K8AZ** & K8NZ, KQ8M. **W8LT:** KD8NS, KU8E. **W9AZ:** AK9F, K9NR, K9ZO, WB9HAD. **W9RE** & WA8YVR, WB9POH, Net. **N9NB** & N9NC. **KM9D** & Pac. **W9EBN:** KD9YB, KS9E. **KB8AC** & WD8LLR. **W0AIH** & K0FVF, KM0O. **W0BXR:** WA3TIH, K9AYK, K9WA, N9OK, W9TW, WB9ASF, K0IS, KA0OVA, N0EL, NU0G, W0OJD, WD0DUK. **N0XA** & K0UAA, K0VBU, KB0G, KB0U, W0JLC. **K0LIR:** AA0A, W0HBH, WB0IUN.

JA9YBA: JA9VDA, JA9-10148, JH9VSF, JJ3URK, JR0BAK. **JA1YWX:** JM1CAX, JO1BMV, JH7PKU, JH9GGH. **JA1YAD:** JP1DMX, JS1DSC, JO3OOB, JH5GHM, JA9UFS. **JA1YXP:** JO1JOZ, JI2DLF, JH9CAU. **UZ0QWT:** Kolomijev, Glinsky, Kazakata. **LZ9A:** LZ2DF, LZ2GR, LZ2-E-72. **LZ1KVZ:** LZ1GC, LZ1NK, LZ1ZF. **LZ2KLW:** LZ2CJ, Asenov. **LZ1KOZ:** LZ1YE, LZ1-I-233, Uzunov. **OK5TOP:** OL1BLN, OK1DFP, OK1DOK, OK1DWX, OK1FCW, OK1FOW, OK1JDX. **OK3KAP:** OK3CGI, OK3TPV, OL8COS, OL8COZ, OL8CUT. **OK1KWP:** OK1AQM, OK1DRZ, OK1OAU. **OK3KII:** Not shown. **OK1KLX:** OK1DCF, et al. **OK2KHF:** Not shown. **OK1KQT:** OK1DKJ, OK1DXO, OK1FYA, OK1SVB, OK2BWY. **OK3KWK:** OK3TEI, et al. **OK1KQH:** OK1DOS, et al. **OK1KCF:** Not shown. **G3FVA:** G3PFZ, G3SVW, G3ZDM, G4HON. **OH2HE** & OH2BMD, OH6DD. **DL0KF:** DJ4FZ, DJ6TN, DJ7SW. **DL6RAI** & DL1MAJ, DL5MAE. **DL0KI:** DF6LI, DJ8FR, DL5LAW, DL6LAU, DL8PY. **DF2RG** & DL7MAE. **DL8NBE** & DJ9MH. **DF4XG** & DL2HAA, DL9YX. **HG9R:** HA9PP, HA9RU, HA9RX. **HG8Q:** HA8IE, HA8JV, HA8PG. **I2UIY** & I2UBI, IK2DVG. **OH0MB/OJ0:** OH2BU, W2GD. **PA0ERA** & PA3DQW, PA3EYZ. **PA2DXY** & PA0VDV. **PA3BPL** & PA0NZH, PA3AUC, PA3BAS, PA3CLM, PA3DSB. **PA3AQL** & PA2GON, PA3ALP, PA3DHR, PA3ELX, PA3EXI. **SP2ZFJ** & SP2RIB.

SP2ZCF: SP9CVQ, SP9ENV, SP9FMP. **GM3IGW:** G3IGW, G3BBD, G4GLL. **UR1RWX:** UR2RJ, UR2RDJ, UR2RNA, UR2RRR. **UR1RYY:** UR2RE, UR2RDO. **UZ1AWT:** RA1CA, UA1ALZ. **UZ3TYA:** UV3TA, UV3TF, UV3TW. **UZ1AWO:** UA1-169-2398, UA1-169-2418. **UZ3DYF:** Zamorgonof, Kuznetsof. **UQ1GWW:** UQ2-037-83, UQ2-037-116. **UQ1GWY:** UQ2GIU, UQ2GRX. **UP1BYL:** UP2BMW, UP2-038-1162. **UP1BWC:** UP2-038-1732, UP2-038-1734. **UB4XWB:** UB5-062-240, Vodotiec. **UB4CXU:** UB5CDX, UB5CFD, UB5-080-1115. **YT2R:** YU2HO, YU2MM, YU2MY, YU2OG. **YT3T:** YU3BQ, YU3HR, YT3EW. **4N2D:** YT2ID, YT2VM, YU2DZ, YU2FK, YU2TL, YU2WQ, Ante.

Phone Multi-Op Station Crews

KY1H & KR1R, N1EMG. **AK1L** & KA1X. **W1OP:** N1AKO, KA1RSH. **WB2P** & Net. **K5NA** & WB2Q, KU2Q. **KE2BA** & N2HIC. **K3TUP** & N3BJ. **K3WW** & Net. **K3ND** & Net. **K3KG** & NQ4I. **N4RJ** & N4NX, Net. **WB4ZNH** & Net. **WB4GNT** & Net. **KC4MJ** & WA4CUG. **K4TEA** & Net. **W4OTX** & Net. **K4JAG** & N4ONI. **N4HOH** & N4PLM. **K8CFU** & N4MPQ. **WD5R** & N5ECT. **KA5DLM** & KD5RW, N5JBZ, N5KDA. **WG5X** & WG5W, K5MS, KA5PEL, KB5CX, N5LXN, N5LYC. **W5LTR** & AA5B, KD5VV. **W5MPX** & KB5AWK, N5GCQ, WD5ICM, WD0CEN. **N6LL** & AA6RX, K6PVC, WA6CDR, WA6DVG, W8TIF. **WB6EGE:** KA6OPN, N6MQ, N6QC, WB6WPO. **NK7U** & NI7T. **KA7AUH** & N7HJJ. **KE8FX** & K8AQM, KB8ECG, KE8JZ, N8ABW, N8INX, NN8H, NU8Z, WB8LKL. **WB8DIT** & N8ISA. **WA8DXG** & W8JGU, WA8RCN. **WD9INF** & W8IQ, W8UPH, WB8JKR, WB8MZZ. **W8SJU** & N8FCZ, WB8PHI. **W8IMZ** &K1DWQ. **W9RE** & WA8YVR, Net. **KD9CC** & KE9IR, N9HAB. **W9EBN:** KA9JUB, KA9TBM, KA9VIS, KA9VIT, KD9YB, N9FBB, N9GRD. **KR9G** & WD0FLJ. **WD9DSS** & K9HWU, NU9T. **KR9S** & K9GM, KR9R, WB9YXY. **K0GAS** & KJ0G. **N0XA** & K0VBU, NX0I, W0JLC. **W0CEM** & AB0S, K0WA. **KB0U** & N0LID, WA0TKJ, WD0SRI. **KD0OZ** & KA0QBF, KA0UPF, N0FCD, N3DCT. **AA0A** & KA0DQI, KB0KK, W0HBH, WF0E. **VE2UMS:** VE2AKZ, VE2GDZ, VE2YLB, VE2GOP, VE2LPS, VE2GDA, VE2WLS. **VE3FKK** & VE3OHM. **UG7GWO:** UG6GAW, Karapetian, Peluzian. **OE3XLA/3:** OE3PRU, OE3WQB, OE3WTW, OE3WZ. **LZ9A:** LZ2CC, LZ2DF, LZ2-E-72. **OK7MM:** Not shown. **OK5MVT:** Not shown. **OH2HE** & OH6DD, OH6EH. **I8CZW** & I8QLS, I8YGZ, IK8DOI. **HB9CXZ** & HB9ALM, HB9BLQ, HB9SFD, HB9STL. **UR1RYO:** UR2RDM, UR2RHB, UR2RPZ. **UZ6AXE:** RA6AUV, UA6BGL, UA6-101-218. **UQ1GYT:** UP2BIM, UQ2GNL. **UQ1GWY:** UQ2-037-558, UQ2-037-560. **UP1BYL:** UP2BMW, UP2-038-1162. **UP1BZO:** UP2BMX, UP2-038-1751. **UB4SWB:** RB5EX, UB5NQ, UB5SDE. **YT2R:** YU2HO, YU2MM, YU2MY, YU2OG.

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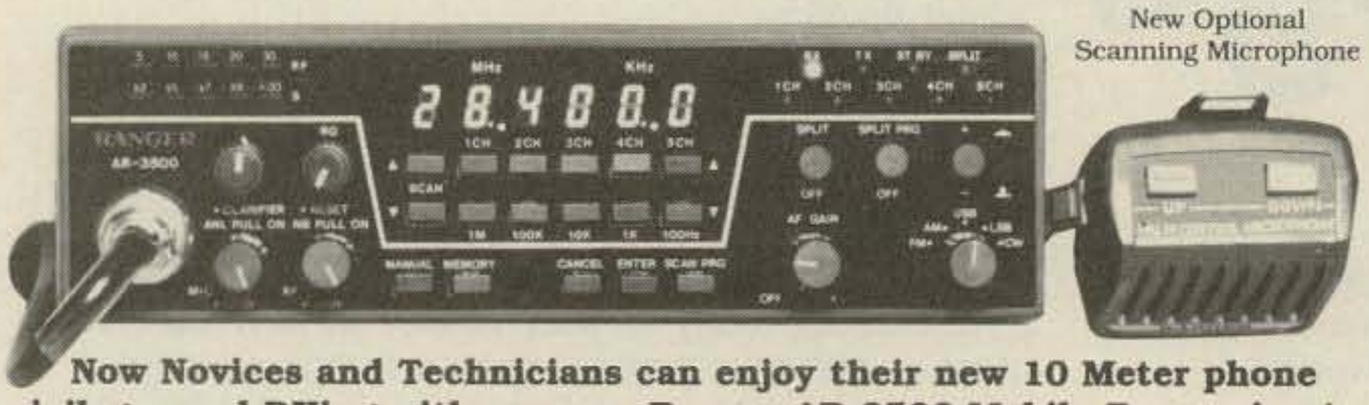

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AGGREGATE CW AND PHONE CLUB SCORES

Total Score	Club Name	Top CW	Top Phone
2,793,833	Yankee Clipper Contest Club	NP4A	K5NA
2,692,487	Frankford Radio Club	AA1K	W3BGN
2,072,454	Southeastern DX Club	KP2A	N4RJ
1,412,367	Hoosier Contesters	W9AZ	WB9HAD
1,371,713	Mad River Radio Club	K8CC	K3TUP
1,158,625	Potomac Valley Radio Club	W3LPL	K3ZO
477,662	Society of Midwest Contesters	KS9O	KR9S
463,626	Dixie DX'ers	NQ4I	K3KG
432,401	Radio Club RTV Zagreb	YT2R	YT2R
394,494	Kansas City DX Club	N0XA	N0XA
336,005	Viimsi Radio Club	UR1RWX	—
325,212	Ronai Sandor Radio Club	HG9R	—
313,446	Mile High DX Association	W0ZV	—
309,894	OK1OAZ Contest Team	OK5TOP	—
278,518	Western Wisconsin 160 Group	W9UP	W9UP
269,858	Kaunas Polytech Inst. Radio Club	UP3BO	UC2IDC
261,428	Bavarian Contest Club	DL6RAI	—
261,386	Murphy's Marauders	K1TO	—
261,338	Lohjan Radio Club	OH2HE	—
259,272	Radioklub Partizanske	OK3KAP	—
247,093	Bulgarian Contest Group	LZ9A	—
235,801	Rubber Circle Contest Club	K5MM/7	K7SS
235,733	Lithuanian Contest Group	UP1BYL	UP1BYL
221,544	Radio Club Ivan Cankar	YT3T	—
215,850	N. Tesla Radio Club	4N4Y	—
215,215	Kiel Canal Activity Group	DL0KF	—
195,976	Michigan DX Association	W0CD	—
194,972	Willamette Valley DX Club	AI7B	AI7B
190,460	Minnesota Wireless Association	W0AIH	—
177,461	Southern California Contest Club	N6DX	—
170,304	Central Lancashire ARC	G4OBK	G0FDX
167,416	Grand Mesa Contesters	KJ0G	K0GAS
161,975	Providence Radio Association	W1OP	W1OP
153,264	Obstinski Radio Club	LZ2KLW	—
149,250	Salt City DX Association	WA2UUK	—
136,662	North Texas Contest Club	WM5G	K5WXZ
127,481	Club OK1KFW	OK1DFF	OK1DFF
122,561	St. Louis ARC	K0LIR	AA0A
118,982	Louisville HF Society	N4XM	—
117,000	Davenport Radio Amateur Club	W0BXR	—
102,456	Carolina DX Association	AA4V	AA4V
93,998	Radio Club of Sarret	HG8Q	—
87,120	Radioklub OK1KWP	OK1KWP	—
83,706	Northern Ohio Amateur Radio Society	K8SVT	K8SVT
83,538	Club YU1DKL	YU1KQ	—
75,225	Radioklub OK3KII	OK3KII	—
71,995	South Manchester Radio Club	G3FVA	—
69,433	Gower Gulch Gang	N6LL	N6LL
66,700	Radio Club Dubrovnik	4N2D	—
66,552	Fraser Valley DX Club	—	KA7AUH
64,310	Big River Contesters	—	W5LTR
63,618	Southwest Ohio DX Association	—	W8ILC
62,132	Radioklub Rubena	OK1KLX	—
61,800	San Diego DX Club	N6AW	—
57,081	Petaluma DX Society	WB6EGE	WB6EGE
56,544	Eastern Iowa DX Association	KJ0H	—
55,298	Radioklub ORA	OK2KHF	—
53,544	Order of Boiled Owls	NA2M	
46,424	Arrowhead Radio Amateur Club	W0RXL	—
45,072	Lakeway Amateur Radio Club	—	N4FNB
41,927	Tallin Radio Club	UR2RND	—
37,796	Radioklub VSDS	OK3KWK	—
37,485	Farout Radio Club	—	W8IMZ
31,110	Western Washington DX Club	W7BYK	—
30,746	SP DX Club	SP9ENV	SP6CZ/6
27,477	Riga Radio Club	UQ2GIP	—
22,041	Union Metro. des Sans Felistes	—	VE2UMS
20,034	South Florida DX Association	WA4CTC	—
19,918	Central Pennsylvania DX Club	W3CNS	—
17,453	Nicolaev Radio Club	—	UB5ZHQ
17,089	Kanazawa University ARC	JA9YBA	—
12,072	Utah Contest Club	KE7KF	KE7KF
10,241	University of Tokyo ARC	JA1YWX	—
7,981	Radio Club of Polva	—	UR1RYO
6,293	Grant County ARC	W9EBN	—
5,456	Maui ARC	—	K6GSS/KH6
4,750	ES DX Contest Club	SP2ZFJ	—
3,828	T.T.T. ARC	JA1YAD	—
801	Radioklub OK1KCF	OK1KCF	—
136	Shibaura Institute of Tech. ARC	JA1YXP	—

Number groups after calls denote score, total QSOs, multiplier, countries worked. Multi-op scores follow single-op listings. State, province, and country certificate winners are shown in boldface.

CW
SINGLE-OPERATOR
NORTH AMERICA
UNITED STATES
Connecticut

K1TO	**245,798**	**753**	**97**	**43**
N4XR	167,034	528	97	42
K8HVT	78,190	426	70	17
W1WY	34,125	187	65	19
W1AB	25,694	141	58	20
W1WEF	18,847	159	47	11
NJ1V	15,588	200	36	4

Massachusetts

W1PL	**127,571**	**519**	**83**	**31**
W1AX	13,630	91	47	14
KR1R	9,594	100	39	6
KQ1F	6,534	80	33	6

New Hampshire

KM1H	**364,302**	**893**	**111**	**56**
		(KQ2M Op.)		
N1ACH	77,745	376	73	22
WA3ECT/1	16,974	149	46	9
KN1H	6,322	100	29	3
KA1NXT	4,163	83	23	2

Rhode Island

KS1J	**130,720**	**543**	**86**	**33**
K2MN	10,920	141	35	5

Vermont

K1IK	**41,846**	**230**	**61**	**22**

New Jersey

NY2L	**193,516**	**501**	**101**	**47**
WA2SRQ	156,904	595	88	34
WB2P	83,025	309	81	33
K8XR	64,640	423	64	14
W2CVW	37,088	227	61	16
K2FL	19,278	147	51	11
N2MR	18,189	160	47	9

New York

K2EK	**352,833**	**923**	**109**	**54**
K5NA	305,292	894	103	47
NA2M	53,544	262	69	24
KW2J	50,858	353	59	8
NQ2H	36,465	293	55	7
KD2HE	12,250	160	35	3
W2KTF	10,850	140	35	4
W2GKZ	9,180	120	34	4
WB2QBO	1,224	30	17	3

Delaware

AA1K	**321,963**	**925**	**107**	**54**

Maryland

W3LPL	**249,200**	**829**	**100**	**45**
		(KE9A Op.)		
K3ZO	171,304	624	92	38
W3FX	23,688	174	56	10
W3GN	12,480	151	39	3

Pennsylvania

W3TS	**167,508**	**744**	**81**	**26**
W3UM	137,861	505	89	37
W3QM	122,845	592	79	26
W3FV	112,422	487	82	29
K3IPK	105,413	552	77	23
K5ZD/3	97,600	431	80	28
W3OV	95,037	407	79	28
K3OO	74,439	299	81	33
WB3CAC	67,914	406	66	20
KS3F	42,893	302	59	13
W3CNS	19,918	189	46	7
WB3FAA	17,043	205	39	4
N6CQ/3	16,830	330	51	11
W3AJS	12,280	140	40	4
W3AP	9,424	103	38	7
KU3X	9,240	112	35	6
NE3F	6,384	101	28	4
NA3K	5,642	79	31	4
W3QIR	4,788	68	28	5

Alabama

N4JF	**18,705**	**199**	**43**	**6**

Florida

N4IN	**168,096**	**499**	**103**	**48**
W4OWJ	60,014	260	74	24
WA4CTC	20,034	121	54	18
W4WKQ	12,635	173	35	2
W1SE	3,458	65	26	2

Georgia

K4PI	**184,146**	**719**	**94**	**41**
W1UA	64,253	400	67	16
WX4G	58,730	301	70	21
KN4B	55,208	351	67	15
W4DXI	38,552	259	61	12
W4DMB	31,564	272	52	8
K4SB	30,687	259	53	7
K4EZ	26,837	256	47	6
WA4CUG	13,455	162	39	3
KF4CQ	12,768	136	42	5
N4HOH	6,808	77	37	6
WB4ZNH	5,104	85	29	2
N8LM	4,396	74	28	3
NU4D	3,000	47	25	4

North Carolina

K4POL	**88,948**	**488**	**74**	**20**
W4TMR	74,658	458	69	15
K4PB	41,022	348	53	7

South Carolina

AA4V	**74,241**	**389**	**73**	**22**
K0EJ	51,728	358	61	13

Tennessee

K4LTA	**74,025**	**527**	**63**	**9**
K4YPX	6,912	99	32	3

Virginia

W4RX	**213,147**	**700**	**99**	**42**
W4DHZ	63,911	266	79	29
W4XD	55,578	416	59	8
K4OD	23,400	203	50	8
W4YE	16,277	170	41	7
W9LT/4	2,750	52	25	2

Mississippi

W5XX	**100,776**	**536**	**76**	**22**
WB5KYK	23,618	214	49	7

New Mexico

WD5T	**24,888**	**165**	**51**	**8**
KN5S	14,310	143	45	4

Oklahoma

W5EHY	**14,805**	**151**	**45**	**4**

Texas

WN4KKN	**59,496**	**323**	**67**	**17**
WM5G	54,180	276	70	19
		(KM5R Op.)		
K5WXZ	49,368	291	66	15
W5FIX	49,312	266	67	19
WM5K	34,599	264	57	9
KF5UN	22,880	161	55	10
KY5N	5,370	81	30	4
W5IRP	140	10	7	1

California

N6ND	**123,420**	**537**	**68**	**16**
KI6MS	89,712	451	63	13
N6AW	61,800	277	60	12
N6JV	53,235	332	65	14
N6GG	41,968	271	61	2
W6FSJ	38,280	234	58	11
K6MO	31,914	192	54	11
KI6O	30,628	251	52	5
W6OUL	27,225	206	55	8
W6BA	24,530	175	55	10
N6AA	21,828	175	51	9
N4ARO/6	17,328	141	48	6
W6JTI	16,560	149	46	6
WB6JMS	12,604	105	46	7
K6LRN	9,672	101	39	4
K6TS	9,200	98	40	4
W6HDO	7,956	84	34	8
N6JM	6,039	68	33	5
KE6VL	480	16	15	1
AA6EE	138	10	6	2

Arizona

K7OX	**90,160**	**545**	**70**	**16**
W7ZMD	29,928	198	58	12

Idaho

KA7T	**73,219**	**410**	**59**	**9**
N7HJM	29,008	261	49	5

Montana

KE7X	**48,730**	**369**	**55**	**6**
KS7T	24,900	218	50	5

Nevada

W7TVF	**24,336**	**178**	**52**	**11**

Oregon

K5MM/7	**164,016**	**674**	**72**	**20**
AI7B	109,952	498	64	13
AD7T	12,285	98	45	7

Utah

K7QA	**7,770**	**93**	**37**	**2**
KE7KF	330	15	10	1

Washington

K9JF/7	**80,520**	**440**	**61**	**12**
WC7Q	33,935	262	55	8
W7BYK	31,110	222	51	9
K7XX	20,962	184	47	6
W7IEU	15,120	122	48	7
NK7V	5,390	68	35	2

Wyoming

WC7S	**71,676**	**440**	**66**	**14**
NS7Z	8,702	104	38	2

Michigan

W8UA	**43,920**	**308**	**60**	**12**
W8VSK	30,975	198	59	11

KC8P	17,865	182	45	3
K8CV	9,072	120	36	2
W8WVU	7,076	113	29	2

Ohio

KU8E	**95,965**	**398**	**85**	**32**
W8FN	69,692	328	76	28
K8KEM	64,046	459	62	9
W8ILC	63,618	372	69	18
K8MR	52,204	340	62	13
K8NZ	45,276	239	66	20
W8CAR	38,136	292	56	10
WD9INF	34,236	286	54	5
W8IQ	34,200	305	50	5
K8SVT	28,815	253	51	6
KA1S	20,124	213	43	5
N8ATR	9,720	123	36	4
KD8NS	9,503	88	43	7
W8ON	9,430	83	46	5
WB3KKX/8	7,296	102	32	3
KA8VVE	4,727	77	29	2
KW8N	3,444	57	28	3
K8HF	2,366	41	26	2

West Virginia

K8OQL	**46,665**	**319**	**61**	**15**
KV8S	41,580	340	54	9
KC8JH	20,205	201	45	5

Illinois

KS9O	**85,827**	**567**	**67**	**14**
W9YYG	66,531	424	67	14
K9IFO	64,576	416	64	13
NA9J	36,994	313	53	4
W9LNQ	24,843	234	49	4
KK9A	22,656	215	48	5
WA9PQY	17,520	166	48	4
K9BG	16,330	154	46	4
NQ9M	10,720	125	40	3
KG9D	10,008	124	36	2
W9HOT	7,310	94	34	2
W9CA	4,212	72	27	2

Indiana

AF9Y	**143,136**	**603**	**84**	**31**
K9UWA	105,944	441	82	29
KD9SV	61,065	315	69	19
WB9CIF	26,508	258	47	4
NA9N	13,680	171	38	2
W9JVF	2,875	54	23	3
N9ACD	1,869	40	21	2

Wisconsin

W9UP	**139,158**	**697**	**81**	**27**
		(N8BSH Op.)		
WB9YXY	120,771	587	81	27
W9WAQ	96,871	532	73	20
WA1UJU	68,571	555	57	3
WB9HRO	34,944	275	56	6
W9HE	34,424	298	52	4
W9KHH	18,400	182	46	4
WA9TZE	3,726	66	27	2

Colorado

W8ZV	**313,446**	**856**	**102**	**47**
K4XU/0	79,560	403	65	14
KJ0G	45,540	327	60	9
KI0G	26,214	225	51	4
W0GOR	22,419	184	53	5
NZ7W/0	19,257	175	49	5
K0OST	4,958	54	37	4
N0ZA	2,200	50	22	1

Iowa

KJ0H	**56,544**	**388**	**62**	**12**
N0B8	25,705	217	53	3
K0RW	13,530	147	41	3

Kansas

W0UY	**32,945**	**270**	**55**	**7**

Minnesota

K0PK	**89,700**	**605**	**65**	**12**
W0HW	65,880	477	60	9
W1GV	56,898	453	58	6
W0RXL	46,424	373	56	5

Missouri

N0TT	**129,899**	**682**	**77**	**21**

Nebraska

KV0I	**26,640**	**261**	**48**	**2**

North Dakota

NS0Q	**22,050**	**201**	**50**	**3**
WB0O	15,364	148	46	4

South Dakota

KD0EE	**28,329**	**201**	**57**	**8**

CANADA

Newfoundland

VO1MP	**221,848**	**413**	**88**	**39**

Ontario

VE6OU/3	**404,670**	**809**	**94**	**39**
VE3BVD	286,982	631	86	33
VE3INQ	221,760	519	84	30
VE3PN	201,600	510	75	21
VE3KP	154,938	512	62	9
VX3CUI	79,768	320	52	3
VE3HCT	44,462	197	47	4
VE3KK	2,961	30	21	2

Manitoba

VE4JB	**63,840**	**234**	**57**	**7**

Saskatchewan

VE5UF	**172,380**	**539**	**65**	**12**
VE5XU	76,572	293	54	5

Alberta

VX5RA/6	**64,636**	**257**	**52**	**4**

British Columbia

VE7WO	**71,665**	**269**	**55**	**7**
VE7HDX	61,074	212	58	10
VE7BS	52,800	190	55	10

Bahamas

N4RP/C6A	**20,520**	**112**	**36**	**6**

Bermuda

VP9AD	**25,935**	**129**	**39**	**8**

Dominican Republic

HI8LC	**21,115**	**98**	**41**	**9**

Mexico

XE1OH	**8,910**	**64**	**27**	**6**

Puerto Rico

NP4A	**870,492**	**1034**	**129**	**74**
		(K1ZM Op.)		

U.S. Virgin Islands

KP2A	**376,053**	**644**	**103**	**48**
		(K4TEA Op.)		

ASIA

Israel

4X4NJ	**248,048**	**357**	**74**	**58**

Japan

JA5DQH	**20,956**	**132**	**26**	**15**
JA2ODS	10,794	75	21	12
JE1SPY	8,959	81	17	9
JA7TQK	6,174	68	18	12
JA1SJV	440	30	5	4
JR0XOJ	400	10	5	3
JA4GXS	108	6	3	4
JM1SOX	102	9	3	3

Malaysia

9M2AX	**15,334**	**79**	**22**	**22**

U.S.S.R. ASIA

Armenia

UG6GAW	**250,932**	**411**	**66**	**54**

Asiatic Russia

UA9FAR	**117,440**	**335**	**40**	**40**
UV9FM	85,567	234	41	41
UA9CBO	77,120	229	40	40
UA9KK	72,352	218	38	38
RV9CFA	70,161	214	39	39
UA9AQN	64,935	193	37	37
UA9MR	43,452	158	34	34
UA9JEL	36,772	143	29	29
UA9YJP	27,027	122	27	27
RV9CFR	16,390	95	22	22
UZ0AB	13,662	72	23	23
UA9XHT	5,235	46	15	15
UA0FM	4,961	75	11	9
RA0JJ	2,810	61	10	9
RA0FA	2,340	49	9	7
UW0LAF	358	40	2	2

Azerbaijan

UD6DKW	**50,820**	**160**	**35**	**35**
UD6DC	23,188	78	34	34

Georgia

UF6FAL	**69,156**	**224**	**34**	**34**
RF6FM	18,144	95	21	21

Kazakh

UL7ACI	**52,332**	**203**	**28**	**28**
RL7PKN	7,755	70	15	15
UL7CEP	3,648	40	12	12
RL8PYL	1,536	23	8	8
UL7DAZ	1,344	27	7	7

Uzbek

UI8BBN	**560**	**20**	**5**	**5**

Saudi Arabia

HZ1HZ	**43,890**	**139**	**33**	**33**

EUROPE

Aaland Is.

OH0/W2GD	**7,182**	**66**	**21**	**21**
OH0NA	60	3	3	3

Andorra

C31LHJ	**23,760**	**156**	**30**	**30**

Austria

OE3NR	**2,016**	**29**	**14**	**14**

Belgium

ON4UN	**427,242**	**720**	**93**	**62**

Bulgaria

LZ1XL	**54,650**	**196**	**50**	**45**
LZ2DB	38,184	194	37	37
LZ1IA	22,320	120	36	36
LZ2TU	19,344	119	31	31
LZ1WR	68	4	4	4
LZ1NQ	51	4	3	3
LZ1WX	51	3	3	3

Czechoslovakia

OK3CQW	**172,931**	**373**	**79**	**54**
OK1ALW	136,256	388	64	47
OK1DFF	113,880	331	65	49
OK1DRU	82,418	286	58	46
OK1MG	74,214	233	57	51
OK3CZQ	72,650	314	50	45
OK1FZY	40,110	203	42	39
OK3CMW	31,768	177	38	38
OK1KPU	27,240	211	30	29
OK3CSQ	24,035	61	55	47
OK2KBH	21,360	94	40	40
OH2HI	15,330	112	30	30
OK1AKI	14,448	151	24	24
OL1BVR	12,456	132	24	24
OK3FON	12,180	85	30	30
OL6BMH	12,142	108	26	26
OL1BPJ/p	11,700	114	25	25
OK1MNI	10,944	110	24	24
OL4BRD	10,626	122	22	22
OL7BQD	7,540	94	20	20
OL1BPR	6,560	86	20	20
OK1FPV	6,479	82	19	19
OK2BDR	5,567	64	19	19
OK3ZWX	3,600	38	20	20
OK1KZ	3,525	56	15	15
OK3THM	3,116	33	19	19
OL8CTX	1,540	38	10	10
OK1DZD	42	4	3	3

Denmark

OZ1DPW	**15,228**	**110**	**27**	**26**
OZ1JVN	11,934	89	27	27
OZ/FE1JDC	10,902	96	23	23
OZ1DKG	4,599	45	21	21
OZ9BX	4,500	45	20	20

England

G4BYG/A	**187,492**	**372**	**76**	**46**
G3XTT	171,963	334	81	55
G4OBK	150,336	338	72	46
G3ESF	9,975	83	25	25

Finland

OH1AF	**241,272**	**564**	**72**	**51**
		(OH1NOA Op.)		
OH2BYS	28,098	118	42	38
OH4RH	19,375	146	25	25
OH3AC	11,525	89	25	25
		(OH3GD Op.)		
OH2MM	8,586	62	27	27
OH3RF	6,084	39	26	26

France

F3AT	**21,645**	**100**	**39**	**33**
F6EPO	20,952	113	36	35

Germany (FRG)

DL1JF	**66,042**	**231**	**54**	**44**
DJ7MG	58,200	217	50	38
DL8BAV	13,380	96	30	27
DL1RB	12,879	108	27	27
DL1VJ/A	12,816	77	36	36
DK8KC	7,810	80	22	22
DL1TH	5,364	65	18	18
DL9LAI	5,040	54	21	21
DL1EK	3,750	59	15	15
DK2OY	3,520	50	16	16
DL1ZQ	2,490	41	15	15
DF3CB	164	10	4	4

Germany (GDR)

Y33VL	**207,940**	**492**	**74**	**55**
Y22IC	62,607	294	41	40
Y21BC	13,988	112	26	26
Y25SA	13,851	108	27	27
Y24FA	9,891	99	21	21
Y51XE	9,051	86	21	21
Y26MH/9	6,279	64	21	21
Y24IB	3,211	53	13	13
Y27BN	2,379	39	13	13
Y24HM	1,661	32	11	11
Y73XH	1,456	22	14	14
Y49KF	1,352	22	13	13
Y46IF	145	7	5	5

Greece

SV1NA	**53,439**	**211**	**47**	**45**

Ireland

EI4DW	**49,248**	**180**	**48**	**39**
EI9J	10,664	68	31	31

Italy

I3VHO	**44,892**	**239**	**36**	**36**
I2VXJ	35,301	160	41	38
I0KHP	7,176	56	26	26

Netherlands

PA2REH	**4,454**	**56**	**17**	**17**
PA3ACC	1,680	31	12	12
PA3AMA	888	16	12	12

Northern Ireland

GI4BBV	**37,485**	**124**	**49**	**34**

Poland

SP9GDB	**78,462**	**261**	**54**	**45**
SP1GZF	56,658	256	42	40
SP2ZFU	4,750	30	25	25
		(SP2RIB Op.)		
SP4EAK	4,266	47	18	18

Portugal

CT1AOZ	**247,360**	**412**	**80**	**47**

Romania

YO3CO	**84,048**	**319**	**48**	**45**
YO2IS	73,035	305	45	45
YO6AJI	9,476	79	23	23
YO8FR	5,202	58	18	18

Scotland

GM3PPE	**47,481**	**158**	**51**	**40**
GM3CFS	38,171	137	49	39

Spain

EA7DMF	**67,140**	**190**	**60**	**43**
EA2CR	224	7	7	7

Switzerland

HB9AGA	**51,619**	**248**	**41**	**38**
HB9BEY	16,443	123	27	27
HB9DFY	12,325	100	25	25

Wales

GW4RHW	**43,316**	**151**	**49**	**36**
GW3JI	31,560	150	40	36

Yugoslavia

4N4Y	**215,850**	**496**	**75**	**57**
		(YU4CC Op.)		
YU2TW	129,285	351	65	51
YU4BR	88,380	259	60	47
YU3JZ	27,094	149	38	38
YT3A	20,776	156	28	28
		(YU3SB Op.)		
YU7SF	1,236	26	12	12

U.S.S.R. EUROPE

Byelorussia

UC2WO	**75,680**	**320**	**43**	**41**
UC2SD	44,319	246	33	33
UC2WAO	16,458	124	26	26

Estonia

UR2RME	**67,275**	**267**	**45**	**42**
UR2RHF	58,536	301	36	36
UR2RND	39,326	118	53	45
RR2RW	8,316	49	28	28
UR2ROO	2,601	28	17	17
RR2RU	924	17	11	11

European Russia

RU1DZ	**220,710**	**562**	**70**	**52**
UV6HEK	41,958	207	37	37
UA6BJQ	35,224	197	34	34
UA3YBJ	30,360	197	30	30
UA3ATV	27,565	133	37	37
UA6BPM	25,017	140	31	31
UA4CK	22,788	156	27	27
UZ6HC	16,510	117	26	26
UA3RA	15,876	106	27	27
UA6LIG	14,580	107	27	27
UA1OLL	13,968	102	24	24
UA3YAO	11,550	96	22	22
UA3ICJ	8,900	67	25	25
UA3PHR	5,117	62	17	17
UV6AGF	4,389	42	19	19
UA3DQS	2,145	30	13	13
UA3DEV	1,260	17	14	14

Latvia

UQ2GM	**204,610**	**445**	**74**	**51**
UQ2PQ	186,270	452	70	51
UQ2GKL	172,920	464	66	52
UQ2GN	116,586	391	54	44
UQ2GIP	27,477	115	43	37
RQ2GIG	18,620	129	28	28
UQ2GLW	12,766	97	26	26
UQ2GQN	12,236	111	23	23

Lithuania

UP3BO	**160,272**	**455**	**63**	**52**
UP3BU	4,032	39	21	21

Moldavia

UO5OAL	**44,659**	**220**	**37**	**37**
UO5AP	18,386	116	29	29
UO5OBT	2,550	33	15	15

Ukraine

UB5ZAL	**114,268**	**399**	**53**	**48**
RT5UO	48,257	222	41	39
UB5QK	30,990	205	30	30
UB5EPV	30,810	197	30	30
RB5QW	26,245	181	29	29
UB5RFT	24,810	167	30	30
UB5QKO	21,210	138	30	30
UB5MMP	20,070	131	30	30
UY5TE	18,984	139	28	28
UB5YGQ	18,198	139	27	27
UB5KM	17,134	133	26	26
UB5ZFN	12,064	78	29	29
UB5EF	10,304	94	23	23
UB5YFZ	10,296	87	26	26
UB5VAA	8,424	59	26	26
UB5EQB	7,612	73	22	22
UB5EQG	5,235	80	15	15
RB5QNB	4,650	53	15	15
RB5EX	2,562	39	14	14
UB5VK	2,232	28	18	18

OCEANIA

Australia

VK3IO	**7,098**	**61**	**13**	**11**
VK2BQQ	42	4	3	3

Hawaii

KH6CC	**195,672**	**321**	**62**	**13**
AH6AZ	27,660	94	30	8
KH6IJ	2,100	35	6	3

Marshall Is.

KX6DS	**104,958**	**222**	**49**	**24**
KX6DC	83,908	197	44	14
		(KX6PC Op.)		

Say You Saw It In CQ

New Zealand

ZL2SQ	**5,922**	**38**	**18**	**7**

Wake Is.

KH9AC	**43,935**	**156**	**29**	**12**

SOUTH AMERICA

Argentina

LU2E	**88**	**4**	**4**	**4**

Brazil

PY8CL	**21,420**	**64**	**35**	**11**

Colombia

HK1AMW	**243,017**	**337**	**73**	**32**

Curacao

PJ9J	**253,825**	**361**	**71**	**24**

Venezuela

YV10B	**66,640**	**139**	**49**	**16**

MULTI-OPERATOR NORTH AMERICA

UNITED STATES

Massachusetts

KY1H	**204,192**	**695**	**96**	**42**

Rhode Island

KI1G	**179,010**	**668**	**90**	**37**
W1OP	116,435	455	73	27

New Jersey

K2WI	**214,605**	**670**	**95**	**40**
W2GD	187,889	635	97	41
NF2L	61,548	268	69	25

Maryland

WB3JRU	**40,824**	**321**	**56**	**8**

Pennsylvania

W3BGN	**274,598**	**787**	**103**	**48**
W3GM	153,270	547	90	39
K3WW	76,275	366	75	26
K3ND	39,121	161	71	26
N3BNA	36,993	247	59	15
K3NZ	16,074	111	47	15

Georgia

N4RJ	**205,073**	**695**	**103**	**48**
NQ4I	126,558	557	89	34
WB4GNT	78,064	343	82	30
K4UEE	65,286	254	81	32
KØHLB	46,852	400	53	9
N4UZ	27,387	248	51	7
WA4VDE	21,489	141	57	13

Kentucky

N4XM	**118,982**	**557**	**82**	**28**
N4AR	110,618	468	82	32

South Carolina

K4CNW	**41,340**	**291**	**60**	**14**

Texas

KC5DX	**174,720**	**735**	**84**	**31**

California

N6DX	**125,706**	**532**	**73**	**20**
WB6EGE	44,286	268	61	12
N6LL	41,536	250	59	13

Washington

K7QQ	**181,184**	**666**	**76**	**23**
KR7G	83,281	434	67	16
W7AWA	71,400	341	60	10
K7IDX	43,890	218	70	18

Michigan

K8CC	**197,820**	**787**	**90**	**35**
WØCD	195,976	735	88	35
K8LX	171,396	620	92	39
K8AQM	97,090	558	73	19

Ohio

K8AZ	**57,850**	**335**	**65**	**19**
W8LT	34,713	215	63	15

Illinois

W9AZ	**212,628**	**804**	**94**	**40**

Indiana

W9RE	**205,672**	**790**	**94**	**38**
N9NB	84,845	517	71	16
KM9D	46,431	304	63	13
W9EBN	6,293	98	29	2
KB8AC	5,670	80	30	4

Wisconsin

WØAIH	**190,460**	**817**	**89**	**33**

Iowa

WØBXR	**117,000**	**649**	**75**	**23**

Kansas

NØXA	**206,142**	**705**	**94**	**40**

Missouri

KØLIR	**56,840**	**465**	**56**	**6**

ASIA

Japan

JA9YBA	**17,089**	**121**	**23**	**13**
JA1YWX	10,241	96	19	10
JA1YAD	3,828	70	11	6
JA1YXP	136	28	2	2

U.S.S.R. ASIA

Asiatic Russia

UZØQWT	**96**	**12**	**2**	**2**

EUROPE

Bulgaria

LZ9A	**247,093**	**528**	**77**	**56**
LZ1KVZ	170,432	449	64	50
LZ2KLW	153,264	422	62	51
LZ1KOZ	48,011	213	41	41

Czechoslovakia

OK5TOP	**309,894**	**646**	**87**	**59**
OK3KAP	259,272	574	78	55
OK1KWP	87,120	313	55	48
OK3KII	75,225	313	51	47
OK1KLX	62,132	266	49	45
OK2KHF	55,298	274	43	42
OK1KQT	47,748	223	46	40
OK3KWK	37,796	176	44	38
OK1KQH	23,064	174	31	31
OK1KCF	801	22	9	9

England

G3FVA	**71,995**	**256**	**55**	**42**

Finland

OH2HE	**261,338**	**575**	**77**	**56**

Germany (FRG)

DLØKF	**215,215**	**482**	**77**	**52**
DL6RAI	162,150	462	69	54
DLØKI	146,132	392	68	46
DF2RG	82,775	307	55	50
DL8NBE	71,502	277	51	42
DF4XG	67,983	262	51	44

Hungary

HG9R	**325,212**	**634**	**82**	**58**
HG8Q	93,998	407	43	43

Italy

I2UIY	**339,553**	**669**	**83**	**53**

Market Reef

OHØMB/OJØ	**253,595**	**665**	**67**	**49**

Netherlands

PAØERA	**253,500**	**553**	**78**	**51**
PA2DXY	119,040	363	60	45
PA3BQL	117,684	323	63	44
PA3AQL	19,546	138	29	29

Poland

SP9ZCF	**3,360**	**46**	**15**	**15**

Scotland

GM3IGW	**240,394**	**478**	**77**	**49**

Yugoslavia

YT2R	**347,225**	**646**	**85**	**56**
YT3T	221,544	553	72	56
4N2D	66,700	262	50	43

U.S.S.R. European

Estonia

UR1RWX*	**277,469**	**532**	**83**	**57**
UR1RYY	205,450	494	70	55

European Russia

UZ1AWT	**91,098**	**298**	**54**	**46**
UZ3TYA	72,540	308	45	43
UZ1AWO	39,864	237	33	33
UZ3DYF	31,407	207	29	29

Latvia

UQ1GWW	**122,915**	**311**	**65**	**47**
UQ1GWY	30,492	182	33	33

Lithuania

UP1BYL	**116,748**	**386**	**54**	**46**
UP1BWC	33,363	190	33	32

Ukraine

UB4XWB	**103,518**	**357**	**54**	**49**
UB4CXU	64,887	283	43	40

**Penalty score.*

Check logs are gratefully acknowledged from the following: K6NA, KA1CLV, KD9SV, N8BJQ, NØUU, NZØR, W8IMZ, DL1AM, HA8UB, HK3DDD, LZ1KDP, LZ1PZ, OH1XX, OH2BKF, OK1DEK, OK1DXK, OK1JDJ, OK2BMA, OX3CS, PA3AAV, RA3DOX, RA3DX, RA4NBG, RT4UB, RW4LYL, RZ3DM, RZØCZZ, UA3LEO, UA3PDW, UA4WH, UA6LCW, UA9AJX, UA9FIU, UA9SIJ, UAØQO, UB4JWF, UB4UD, UB4WZA, UB5IFH, UB5JND, UB5LCV, UC2WBM, UC2WBQ, UO5WU, UQ2GQV, UR2RCU, UR2RGN, UT5UJO, UW3PN, UW9CZ, UZ4WWF, UZ4WWO, UZ6AXE, UZ6LWY, UZ9XXM, UZ9QWQ, Y22BF, Y53ZF, Y63-03-N.

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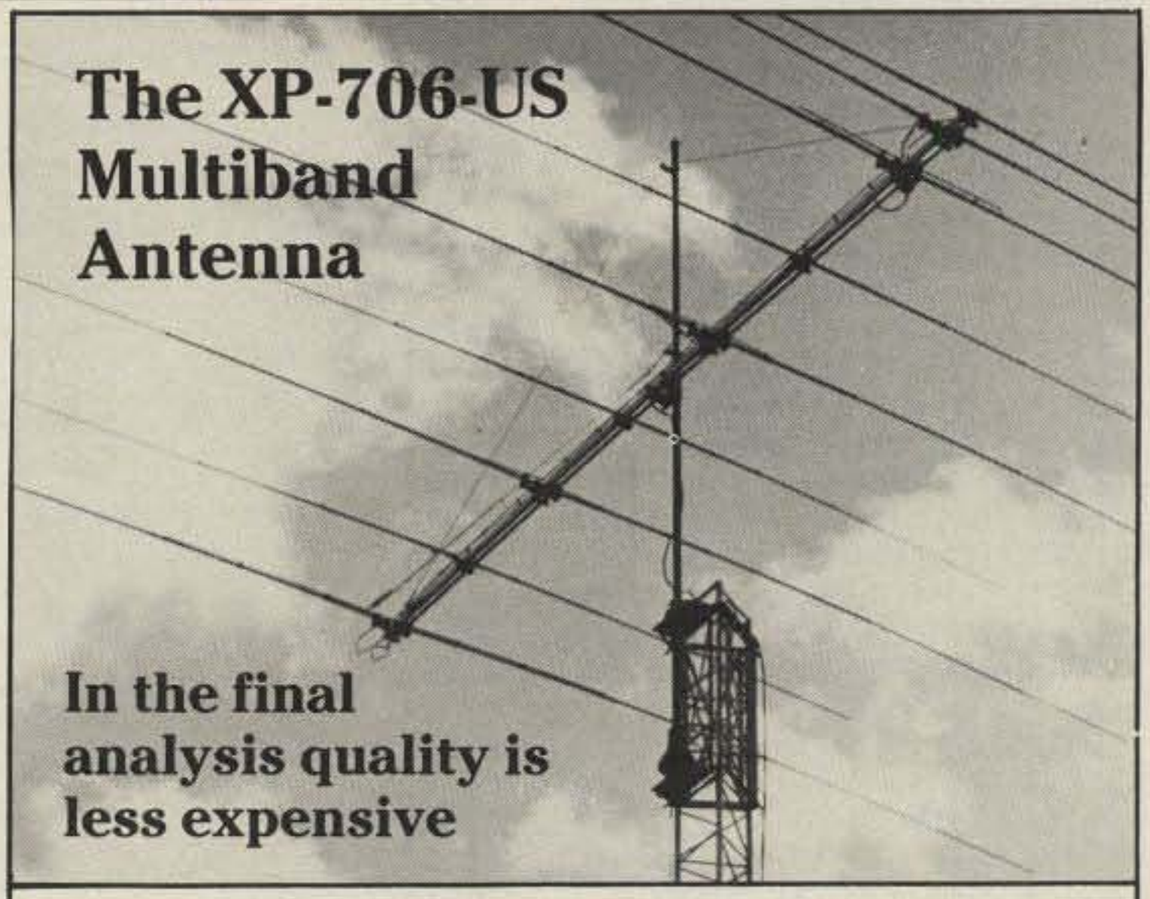

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CIRCLE 168 ON READER SERVICE CARD

PHONE
SINGLE OPERATOR
NORTH AMERICA
UNITED STATES

Connecticut

W1WEF	**20,610**	**190**	**45**	**8**
W1AB	2,808	48	26	3
W1WY	2,448	45	24	3

Maine

N1CTD	**62,472**	**491**	**57**	**8**

Massachusetts

KQ1F	**4,032**	**66**	**28**	**3**
K1XM	2,037	40	21	4

New Hampshire

N1ACH	**22,197**	**172**	**49**	**11**
NE1I	7,290	114	30	13

Rhode Island

K2MN	**4,082**	**71**	**26**	**4**

Vermont

K1IK	**52,841**	**437**	**53**	**10**

New Jersey

K8XR	**86,262**	**579**	**66**	**12**
W2GD	27,307	264	47	7
W2PHW	10,115	137	35	3
W2CVW	6,240	95	30	3
W2SD0	2,369	47	23	3

New York

WA2UUK	**149,250**	**828**	**75**	**21**
K2EK	49,228	287	62	14
K2FJ	5,539	88	29	3
W2QJN	3,036	60	23	3
WA2HMM	2,794	56	22	3
N2HIV	2,147	52	19	2
W2GKZ	1,036	31	14	3

Delaware

AA1K	**34,595**	**215**	**55**	**14**

Maryland

K3ZO	**34,684**	**305**	**52**	**9**

Pennsylvania

W3BGN	**108,675**	**511**	**75**	**24**
W3TS	79,947	537	63	16
W3GM	61,537	480	59	9
W3UM	28,888	246	46	12
WB3FAA	19,866	215	43	4
K4JLD	18,480	189	44	5
K5ZD	17,514	190	42	6
N3BNA	17,158	172	46	6
K3IPK	14,787	228	31	3
KY3N	9,114	135	31	3
K3SWZ	8,510	109	37	3
KA3QFD	5,820	91	30	3
NK3U	4,550	80	26	3
W3AP	1,691	43	19	2

Alabama

WZ4F	**103,776**	**671**	**69**	**18**
N4JF	11,427	138	39	4

Florida

N4IN	**47,450**	**305**	**65**	**17**
AA4MM	45,356	267	68	21
KK4RV	7,875	108	35	3
W4WKQ	1,332	37	18	1

Georgia

WX4G	**90,468**	**647**	**63**	**12**
K4DLI	53,690	374	65	14
WA4VDE	52,569	413	59	10
K4PI	41,781	334	57	11
KA1WR	26,864	280	46	5
KA4C	18,270	207	42	4
K4EZ	16,808	179	44	5
KL7JAR/4	13,068	140	44	4
W4DMB	12,852	147	42	3
W4DXI	10,171	123	39	4
K4ODL	9,435	123	37	3
NU4D	9,307	106	41	4
K4BAI	4,779	84	27	3
KX4R	4,144	74	28	1
N4MNA	3,807	69	27	2
W4GTS	3,450	66	25	3
W4UYC	2,728	62	22	1
KA4HNE	1,512	36	21	1

North Carolina

KF4HK	**96,000**	**541**	**75**	**21**
W4HVU	6,758	103	31	3
K4JTI	5,580	90	30	2
W4UW	4,843	79	29	3
KD4OM	4,230	66	30	4

South Carolina

AA4V	**23,985**	**256**	**45**	**5**
W4TWW	4,077	71	27	3

Tennessee

N4FN8	**45,072**	**436**	**48**	**7**

Virginia

W4TMN	**20,163**	**248**	**39**	**3**
W4LMJ	11,808	158	36	3
W4KMS	10,240	111	40	5

Arkansas

WA5NFC	**52,488**	**458**	**54**	**5**

Louisiana

N05H	**7,910**	**110**	**35**	**2**

Mississippi

WB5KYK	**55,385**	**475**	**55**	**9**
K5QBS	39,368	320	56	11

New Mexico

N5EPA	**39,366**	**331**	**54**	**5**
K5TVC	39,260	354	52	5
KN5S	17,760	176	48	3

Oklahoma

N6CL	**10,218**	**125**	**39**	**2**

Texas

K5WXZ	**27,744**	**260**	**51**	**5**
KD5XH	3,441	50	31	3
N5AFV	1,122	33	17	1

California

K6HNZ	**65,697**	**449**	**61**	**10**
KI6O	34,944	259	56	7
N6JV	13,370	160	35	4
N4ARO/6	9,588	130	34	3
W6CN	2,496	52	24	1
W6PFE	2,304	61	18	3
KG6AO	1,806	43	21	1
AA6EE	360	18	10	1

Arizona

NF7E	**5,278**	**91**	**29**	**1**

Idaho

KA7T	**16,263**	**185**	**39**	**3**

Montana

KE7X	**60,760**	**443**	**56**	**9**

Nevada

W7ABX	**3,354**	**63**	**26**	**2**

Oregon

AI7B	**4,500**	**65**	**30**	**5**

Utah

KE7KF	**11,742**	**144**	**38**	**3**
K7RJ	2,040	51	20	1
N7JLC	1,890	42	21	3

Washington

K7CW	**41,236**	**330**	**52**	**7**
K7SS	12,358	136	37	4
KR7G	4,530	71	30	2

Wyoming

WC7S	**50,344**	**412**	**56**	**8**

Michigan

K8MJZ	**54,505**	**451**	**55**	**6**
K8CV	2,175	39	25	3

Ohio

N8ATR	**53,625**	**450**	**55**	**4**
K8SVT	52,525	446	55	6
K8KEM	30,690	320	45	4
K8MR	20,943	252	39	3
K8NZ	14,235	172	39	3
W8CAR	5,880	92	30	3
KA1S	4,872	81	29	2
W8GDQ	3,745	49	35	4
K8HVA	2,354	49	22	3
KW8N	1,387	32	19	3

West Virginia

KC8JH	**21,950**	**202**	**50**	**5**
W8VEN	9,954	111	42	4

Indiana

AF9Y	**115,977**	**775**	**67**	**14**
K9UWA	44,632	358	56	5
KD9SV	43,616	334	58	8
KB0C	18,576	204	43	3
WB9CIF	12,138	137	42	3
AG9S	9,730	133	35	3
NA9N	7,722	114	33	2
K9IU	1,786	44	19	2
	(WA8YVR Op.)			
WA8YVR	1,248	39	16	1

Illinois

WB9HAD	**261,079**	**1189**	**91**	**36**
W9NB	47,628	413	54	4
K9SM	11,395	125	43	3
W9LNQ	8,892	116	36	3

Wisconsin

W9UP	**139,360**	**908**	**67**	**15**
	(N8BSH Op.)			
WA1UJU	32,289	327	47	3
WA9TZE	22,416	223	48	3
W9WWD	4,814	80	29	2
W9MQZ	3,892	65	28	2

Colorado

N0BSA	**30,104**	**269**	**53**	**5**
N0ZA	19,800	203	46	3
K9MWM	16,027	157	47	3

Iowa

K0RW	**2,295**	**41**	**27**	**2**

Minnesota

W9RXJ/0	**13,692**	**157**	**42**	**3**

Missouri

N0TT	**22,725**	**245**	**45**	**3**

CANADA

Ontario

VX3XN	**207,746**	**581**	**71**	**18**
VE3PN	140,479	459	59	7

Saskatchewan

VE5XU	**12,005**	**69**	**35**	**3**

British Columbia

VE7XO	**1,020**	**21**	**10**	**2**

Costa Rica

TI2CC	**29,939**	**108**	**47**	**20**

Mexico

XE1VIC	**27,800**	**107**	**50**	**12**

United Nations

4U1UN	**294,500**	**746**	**76**	**26**
	(K2GM Op.)			

AFRICA

Amsterdam Is.

FT5ZB	**60**	**3**	**2**	**2**

Madeira Is.

CT3DL	**1,020**	**11**	**10**	**9**
CT3DZ	66	3	3	3

ASIA

U.S.S.R. Asia

UA9MR	**20,159**	**169**	**19**	**19**

Georgia

RF6FIL	**42,834**	**142**	**33**	**33**
UF6FFH	14,532	74	21	21
RF6FHE	3,204	30	12	12

Kazakh

UL7ACI	**184,418**	**477**	**41**	**41**

EUROPE

Andorra

C31LU	**37,536**	**144**	**46**	**39**
C310F	27,180	103	45	38

Austria

OE3NR	**4,301**	**60**	**17**	**17**

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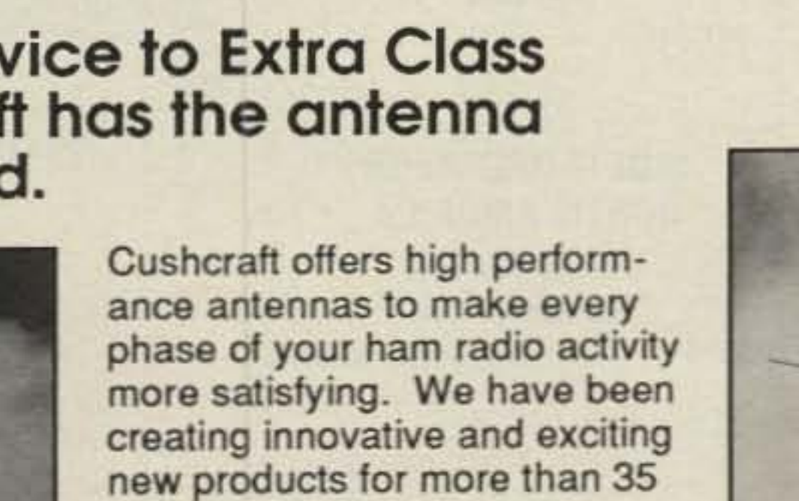

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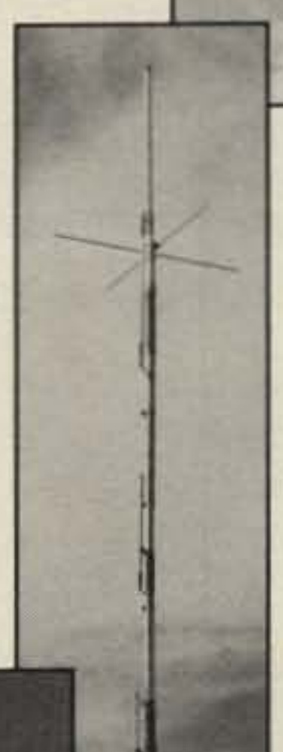

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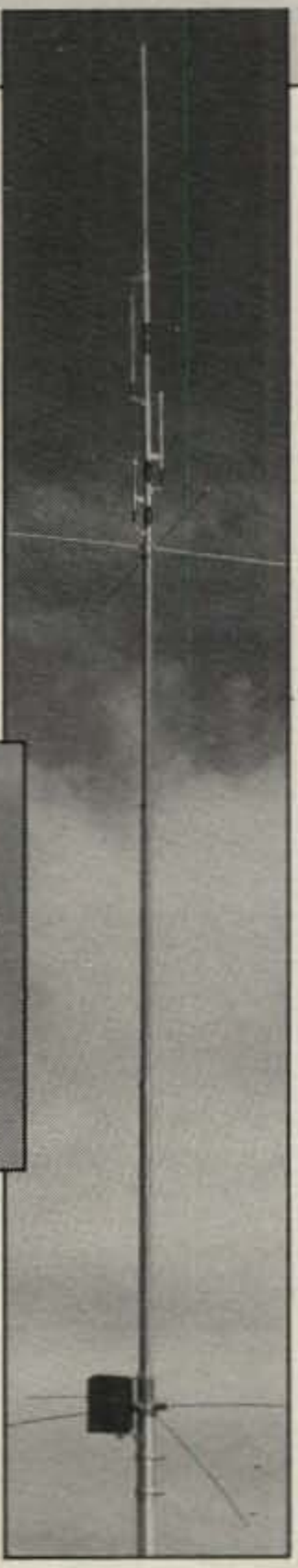

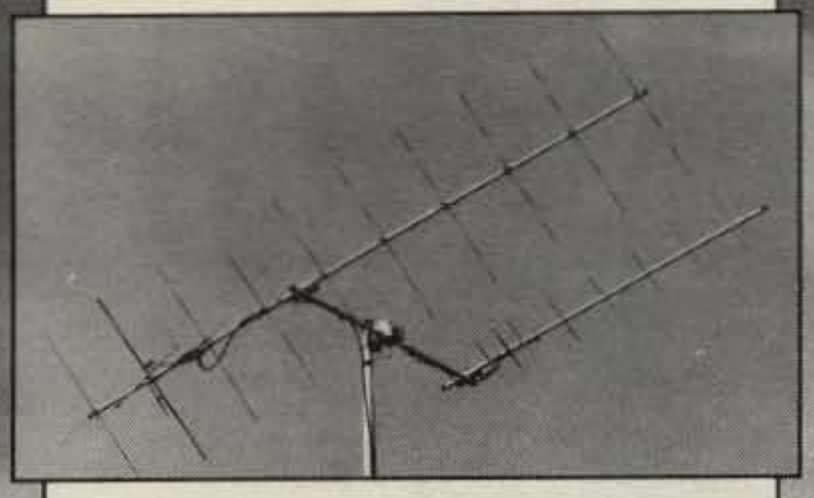

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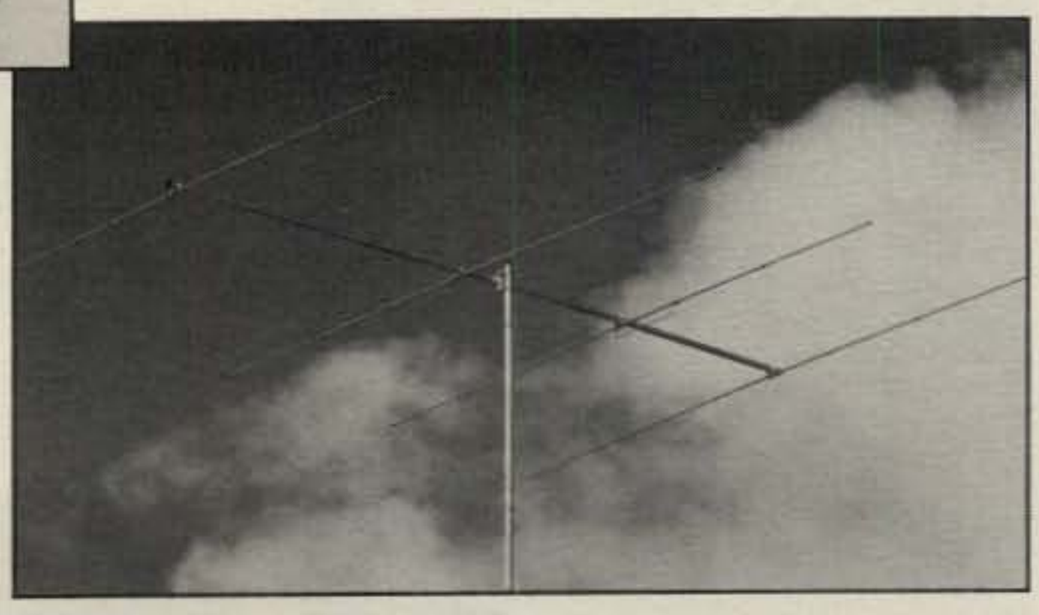

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CIRCLE 124 ON READER SERVICE CARD

Bulgaria

LZ1KVZ	**38,280**	**219**	**33**	**33**
	(LZ1F-194 Op.)			
LZ1KOZ	36,440	170	40	38

Czechoslovakia

OK1DFP	**45,064**	**201**	**43**	**40**
OK3CQW	40,656	174	44	41
OK1DFF	13,601	93	29	28
OK1DWJ	11,803	83	29	29
OK3CMW	10,696	76	28	28
OK3CWO	8,260	54	28	27
OK1DXW	2,280	34	15	15

England

G0FDX	**19,968**	**92**	**39**	**34**
	(G4OBK Op.)			

Finland

OH2BYS	**2,025**	**23**	**15**	**15**

France

F6BVB	**4,554**	**53**	**18**	**18**

Germany (FRG)

DL8PC	**24,780**	**138**	**35**	**35**

Germany (GDR)

Y28AL	**12,771**	**94**	**27**	**27**
Y33UL	3,380	31	20	20

Italy

I4CSP	**2,720**	**35**	**17**	**17**
I0KHP	1,890	30	14	14

Netherlands

PA3DWD	**26,068**	**135**	**38**	**37**
PA0IA	96	6	4	4

Poland

SP6CZ/6	**29,196**	**155**	**36**	**36**

Portugal

CT1TM	**6,096**	**40**	**24**	**20**

Romania

Y06AJI	**14,550**	**91**	**30**	**30**

Spain

EA5AEN	**3,717**	**33**	**21**	**19**
EA5CPH	45	3	3	3

U.S.S.R. EUROPE

Byelorussia

UC2IDC	**59,508**	**412**	**27**	**27**

European Russia

RA4CC	**18,872**	**133**	**28**	**28**
UA3YBJ	5,833	60	19	19
UA3ZAF	5,370	69	15	15
RA5DAD	4,774	40	22	22
UA3RA	2,985	38	15	15
UA4ANZ	2,860	41	13	13

Latvia

UQ2GM	**24,570**	**134**	**35**	**35**
UQ2GN	15,051	97	29	29
UQ2GLW	2,576	29	16	16

Lithuania

RP2BKB	**14,322**	**136**	**21**	**21**

Moldavia

UO5ONQ	**65,340**	**385**	**33**	**33**
UO5OQ	16,848	112	27	27

Ukraine

RB5IOV	**62,370**	**476**	**30**	**30**
RB5MW	19,236	150	28	28
UB5ZHQ	17,453	107	31	31
RB4IGN	12,609	87	27	27
RB5FF	9,450	69	27	27
RB4IUF	5,250	30	15	15
UB5IJI	2,964	45	13	13

Yugoslavia

YU2TW	**72,276**	**226**	**57**	**47**
YU4BR	67,208	183	62	48

OCEANIA

Australia

VK3IO	**1,440**	**35**	**10**	**6**

Hawaii

K6GSS/KH6	**5,456**	**37**	**16**	**4**

Marshall Is.

KX6DC	**3,232**	**25**	**16**	**7**
	(NZ8B Op.)			

New Zealand

ZL2SO	**2,976**	**28**	**16**	**7**

SOUTH AMERICA

Brazil

PT7CB	**2,958**	**19**	**17**	**11**

Colombia

HK4DUM	**12,238**	**116**	**58**	**24**

MULTI-OPERATOR NORTH AMERICA

UNITED STATES

Massachusetts

KY1H	**104,397**	**666**	**69**	**16**

New Hampshire

AK1L	**31,590**	**318**	**45**	**4**

Rhode Island

W1QP	**45,540**	**397**	**55**	**7**

New Jersey

WB2P	**81,740**	**479**	**67**	**19**

New York

K5NA	**160,056**	**859**	**76**	**22**
KE2BA	22,896	206	48	7

Pennsylvania

K3TUP	**156,436**	**903**	**74**	**22**
K3WW	15,588	203	36	3
K3ND	3,216	64	24	3

Georgia

K3KG	**137,256**	**794**	**76**	**24**
N4RJ	118,296	742	72	19
WB4ZNH	85,140	581	66	16
WB4GNT	59,767	466	59	11
KC4MJ	41,688	364	54	10
K4TEA	24,892	238	49	7
W4OTX	12,397	111	49	8
K4JAG	5,568	81	32	5
N4HOH	3,150	63	25	1

North Carolina

K8CFU	**14,532**	**163**	**42**	**4**

Arkansas

WD5R	**66,220**	**569**	**55**	**4**

Louisiana

KA5DLM	**62,016**	**512**	**57**	**8**
WG5X	39,875	343	55	8

New Mexico

W5LTR	**64,310**	**499**	**59**	**8**

Texas

W5MPX	**4,433**	**70**	**31**	**2**

California

N6LL	**27,897**	**235**	**51**	**7**
WB6EGE	22,795	208	47	5

Oregon

NK7U	**78,813**	**523**	**63**	**12**

Washington

KA7AUH	**66,552**	**474**	**59**	**10**

Michigan

KE8FX	**77,691**	**630**	**57**	**6**
WB8DIT	60,192	476	57	5

Ohio

WA8DXG	**100,928**	**715**	**64**	**11**
WD9INF	87,660	679	60	7
W8SJU	63,952	530	56	6
W8IMZ	37,485	338	51	4

Indiana

W9RE	**91,520**	**638**	**65**	**14**
KD9CC	21,902	218	47	4
W9EBN	13,860	159	42	3

Illinois

KR9G	**27,030**	**243**	**53**	**5**
WD9DSS	22,126	230	46	3

Wisconsin

KR9S	**131,580**	**854**	**68**	**15**

Colorado

K0GAS	**35,316**	**297**	**54**	**6**

Kansas

N0XA	**160,965**	**969**	**73**	**20**
W0CEM	91,622	690	61	8
KB0U	27,387	252	51	3

Minnesota

KD0Z	**92,580**	**705**	**60**	**8**

Missouri

AA0A	**65,721**	**536**	**57**	**6**

CANADA

Quebec

VE2UMS	**22,041**	**147**	**31**	**3**

Ontario

VE3FKK	**117,315**	**433**	**55**	**8**

ASIA

U.S.S.R. ASIA

Armenia

UG7GWO	**354,144**	**880**	**42**	**42**

EUROPE

Austria

OE3XLA/3	**38,212**	**190**	**41**	**41**

Bulgaria

LZ9A*	**204,450**	**763**	**50**	**45**

Czechoslovakia

OK7MM*	**168,700**	**643**	**50**	**44**
OK5MVT	704	14	11	11

Finland

OH2HE	**37,680**	**174**	**40**	**40**

Italy

I8CZW	**67,284**	**212**	**54**	**47**

Switzerland

HB9CXZ	**54,000**	**210**	**48**	**12**

Yugoslavia

YT2R	**85,176**	**240**	**63**	**54**

U.S.S.R. EUROPE

Estonia

UR1RYO	**7,981**	**62**	**23**	**23**

European Russia

UZ6AXE	**72,792**	**528**	**36**	**36**

Latvia

UQ1GYT	**10,740**	**105**	**20**	**20**
UQ1GWY	6,622	102	14	14

Lithuania

UP1BYL	**85,622**	**533**	**31**	**31**
UP1BZO	31,724	220	28	28

Ukraine

UB4SWB	**22,770**	**137**	**33**	**33**

**Penalty score.*

Check logs are gratefully acknowledged from the following: N8BJQ, NZ0R, EA1AW, EA5JC, LZ2DB, OK1XX, SP6HTQ, UB4CXU, UB4WZA, Y21YO, Y25SA.

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CIRCLE 74 ON READER SERVICE CARD

New for 1989! The rules for the CQ WPX Award are about to change with respect to defining a prefix. Read on, and perhaps some of those QSL cards you've stored away can be resurrected.

Announcing:

A New Definition of Prefix For The *CQ* WPX Award

BY ALAN M. DORHOFFER*, K2EEK

These days, trying to define exactly what a prefix is or even where the country is can be a very hard job. Typically, you can get the first inkling of what country you're listening to or just finished working by checking the ITU list in the *Callbook*. This gives you the list of prefix-letter blocks assigned to each country. However, based on the letters alone, it may take a bit of interpolating to pinpoint exactly where the country is or what its name is. If you add several numbers to the letters, it makes it even more difficult.

Over the years the criteria for our WPX Award has been the traditional prefix blocks. We've dragged our feet in utilizing and accommodating all of the new and varied prefixes in our awards program. Obviously, it was and is time for a change, a change that reflects what actually is in use today. To say that a prefix doesn't count for the WPX Award even though it is in current use and is authorized by the country's governing body doesn't make too much sense and is a position that is very hard to defend.

So, accordingly, we will change and update our rules to include a new definition of the term *prefix*. At the same time bear in mind that it is virtually impossible to continually maintain and update a current, "up-to-the-moment" Prefix List. Things change on a regular basis, and it would be far easier and perhaps somewhat simpler to publish a yearly Deleted List. I don't know how simple it would be for Norm, K6ZDL, to keep track of deleted prefixes, especially if some of them are reused for special occasions. Currently Norm suggests that an applicant send a list of those prefixes being claimed for the award, plus additional prefixes to cover any possible deletions. Perhaps a Deleted List published on some sort of schedule would be in order.

Another consideration in changing the rules is that whatever changes are made, they shouldn't box us in, whereby we'd have to start over in a year or two. Since these days prefixes are sort of fluid, we should attempt to be, too. For example, if we were to limit a prefix to four digits, other problems would crop up shortly. With all of the new calls and the proliferation of special-event/commemorative calls, there may be more calls such as WB200. Also, Swaziland now has an active four-letter prefix, which could easily go to five digits for any special event. If we don't place a limit on the number of digits, the rules won't have to be changed or even challenged for a number of years.

Last, with regard to the portable rule (C), there have been rumors that the FCC is in the process of changing Part 97 about reciprocal licensing in the USA, and this eventually may add a few more wrinkles to the system. Accordingly, and being consistent with our contest rules, signing portable in the USA should count K6ZDL/7 as K7 and not as W7 as the rules now read. It is not illegal, and is not required anymore.

Effective January 1, 1989, therefore, the new rule (3. Prefixes) for the WPX Award will read as follows:

---

3. Prefixes

A. The letter/numeral combinations which form the first part of the amateur call will be considered the prefix. Examples: K6, N6, Y22, Y23, WD4, HG1, HG19, WB2, WB200, KC2, KC200, OE2, OE25, U3, GB75, ZS66, NG84, etc. Any difference in the numbering, lettering, or order of some shall constitute a separate prefix.

B. Any prefix will be considered legitimate if its use was licensed or permitted by the governing authority in the country of operation after November 15, 1945.

C. In cases of portable operation in another country or call area, the portable designator would then become the prefix. Example: K6ZDL/7 would count as K7, J6/K6ZDL would count as J6, KH6/K6ZDL would count as KH6, etc. Portable designators without numbers will be assigned a zero (Ø) at the end of the designator to form the prefix. Example: LX/K6ZDL would count as LXØ. The portable prefix must be an authorized prefix of the country/area of operation. Maritime mobile, mobile, /A, /E, /J, /P, or interim license class identifiers do not count as prefixes.

D. All calls without numbers will be assigned a zero (Ø) plus the first two letters to form a prefix. Examples: XEFTJW would count as XEØ, RAEM would count as RAØ, AIR as AIØ, etc.

WPX Honor Roll

A. Only current prefixes will be counted toward the WPX Honor Roll standings. A listing of prefixes to be deleted from the Honor Roll will be published annually in *CQ* and will be available from the WPX Award Manager. Prefixes will be deleted from the Honor Roll listing two years after they are no longer authorized for use by the governing authority or by the ITU.

I know that the above changes will make a lot of you happy, but most of all it will bring our WPX Award program in line with our WPX Contest and other programs that use the prefix concept. It will also mean that Norm's computer will get a real run for its money. CQ

*Editor, CQ

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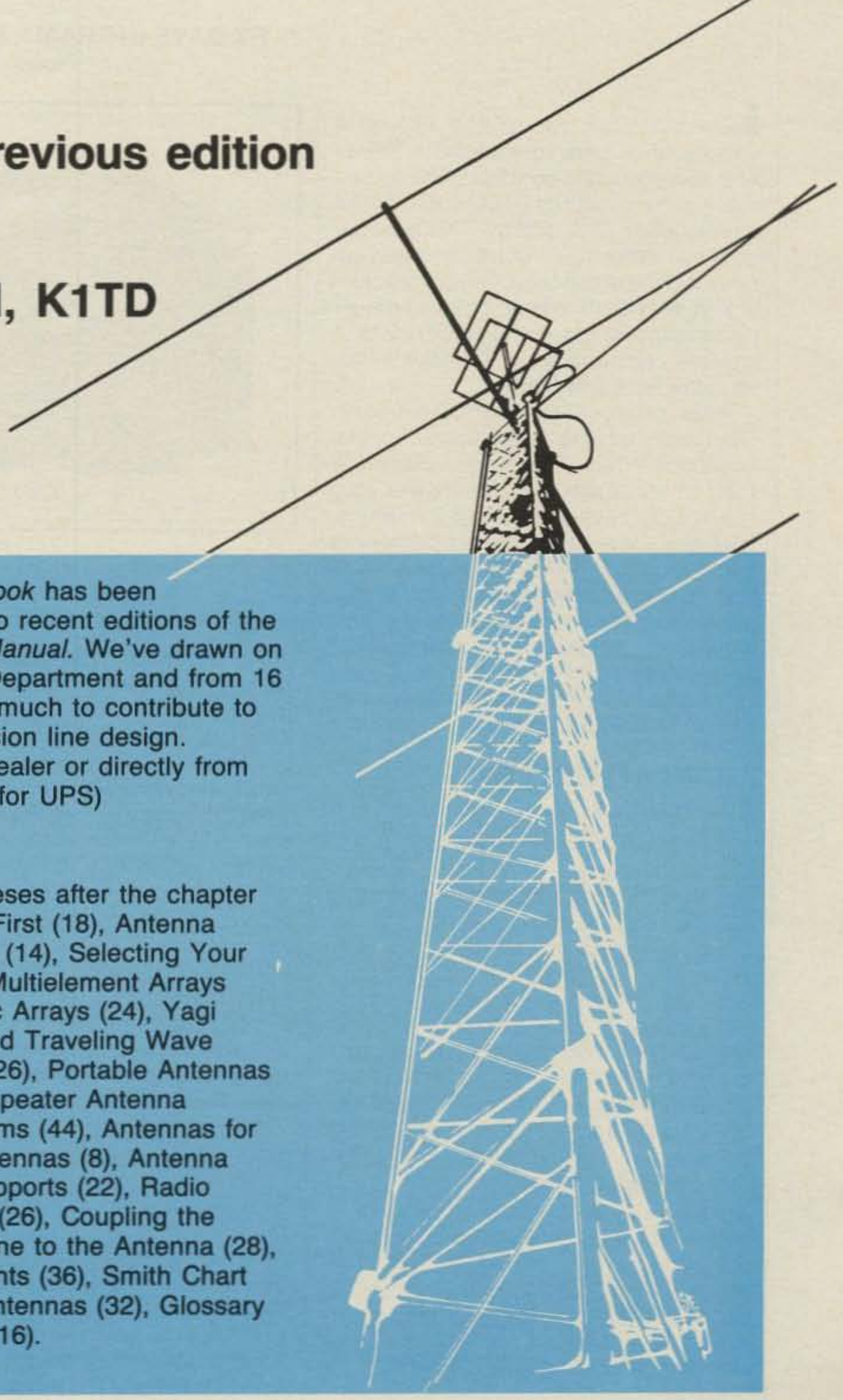

The 15th Edition of *The ARRL Antenna Book* has been dramatically expanded in a similar fashion to recent editions of the *ARRL Handbook* and the *ARRL Operating Manual.* We've drawn on material produced by the ARRL Technical Department and from 16 well-known outside authors who have done much to contribute to the state-of-the-art in antenna and transmission line design. Available in softcover only for $18 at your dealer or directly from ARRL (shipping and handling: $2.50, $3.50 for UPS)

CHAPTER LINEUP:

The number of pages appears in parentheses after the chapter title. Page counts may vary slightly. Safety First (18), Antenna Fundamentals (42), The Effects of the Earth (14), Selecting Your Antenna System (30), Loop-Antennas (16), Multielement Arrays (42), Broadband Antennas (12), Log Periodic Arrays (24), Yagi Arrays (26), Quad Arrays (14), Long Wire and Traveling Wave Antennas (18), Direction Finding Antennas (26), Portable Antennas (10), Mobile and Maritime Antennas (30), Repeater Antenna Systems (20), VHF and UHF Antenna Systems (44), Antennas for Space Communications (32), Spacecraft Antennas (8), Antenna Materials and Accessories (20), Antenna Supports (22), Radio Wave Propagation (26), Transmission Lines (26), Coupling the Transmitter to the Line (18), Coupling the Line to the Antenna (28), Antenna and Transmission-Line Measurements (36), Smith Chart Calculations (16), Topical Bibliography on Antennas (32), Glossary and Abbreviations (4), Contents, Index, etc (16).

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CIRCLE 8 ON READER SERVICE CARD

CQ REVIEWS:

The ICOM IC-781 HF Super Transceiver—Part II

BY DAVE INGRAM*, K4TWJ

Last month we discussed the IC-781's unbelievable array of special features and new operating concepts. We toured the front panel with its 98 controls and the multifunction CRT display. This time we continue with circuit discussions and various technical aspects of this revolutionary rig. We will also report on its on-the-air performance and several other points of interest. I am sure you will like the views, so settle back and read on!

After previous reviews published in *CQ*, I received several stacks of "special questions" mail. This time I especially tried to anticipate and pre-answer your queries. If I have overlooked something, here are some helpful notes. I frequent 14.180 to 14.226 kHz Sundays, 2200 to 2300 GMT just to chat with friends. Answering personal letters is most effective when I write replies in blank spaces left in letters. Be patient. Most queries are answered before I retire to bed in the evening. Send SASEs, please.

Technical Features and Circuit Views

If you've followed my "World of Ideas" *CQ* columns and/or previous rig reviews, you know I am a staunch believer in using a transceiver's block diagram for unbiased technical evaluations. That conviction also held true for the IC-781, but it required some "graphic editing" to fit *CQ*'s pages. The IC-781's original/manual-supplied block diagram was approximately 30 inches long, and it was still packed! It has now been downsized, but let's clarify some technical aspects of special features highlighted in Part I before getting into the big picture.

As previously discussed, the IC-781's twin passband-tuning features separate adjustments for second and third IF stages. When rotating these controls in opposite directions, the passband is narrowed. When they are rotated in the same direction, IF shifting is produced. Fig. 1's highly simplified "redrawing" of passband-tuning-related stages illustrates this concept. Recall your electronic knowledge of receiver and heterodyne principles and follow along. Incoming signals heterodyne with the VFO's frequency to produce a first IF signal at the first mixer's output. Since all shortwave frequency tuning is accomplished at that "front end," subsequent stages operate at fixed frequencies (the classic "superhet principle"; in the IC-781, it also includes quadruple conversion). The second, third, and fourth IF stages are thus fixed-tuned, with one difference in the IC-781—its dual passband-tuning controls slightly alter mixer injection frequencies. This causes a signal(s) to slightly "move up or down" with respect to a filter's center frequency.

ICOM's IC-781 Deluxe HF Transceiver.

Shifting the PBT-1 control from its center affects a slight change on the first and third mixers and L.O./injection frequencies. This effect performs the same function as changing FIL2's center. Hence, we have conventional passband tuning when the mixers tune in opposite directions or IF shift when they tune in the same direction. The PBT-2 control performs a similar action on FIL3 by changing the third and fourth mixer's L.O./injection frequencies. Since FIL2 and FIL3 actions are totally independent, we have dual/twin IF passband tuning. Wild and wonderful!

Before leaving this fig. 1, I should also point out "up conversion" for image rejection in the "front end." (Remember studying images? Two times the IF plus the incoming frequency. Are you rusty?) Also, the IF notch filter uses a similar "shifted injection frequency" on each side of its steep-skirted filter.

The low-noise "front end" designs and simultaneous dual receive features highlighted earlier are also quite interesting in concept. They have been simplified for discussion in fig. 2. Let's start at the antenna and work towards the second IF.

Notice this transceiver's automatic antenna tuner is used on both transmit and receive. A welcomed improvement. The tuner uses a popular T network consisting of variable input and output capacitors separated by a multi-tapped coil. Logic circuitry senses SWR, impedance, and phase differentials. Those "correction signals" are converted to DC voltages which fine-tune capacitor drive motors. When you change bands and the tuner is switched in line, "preset" signals automatically select proper coil taps and capacitor setting with amazing speed. If necessary, fine-tuning occurs as you talk on SSB. Clever!

Electrically following the tuner is the

*Eastwood Village No. 1201 So., Rt. 11, Box 499, Birmingham, AL 35210

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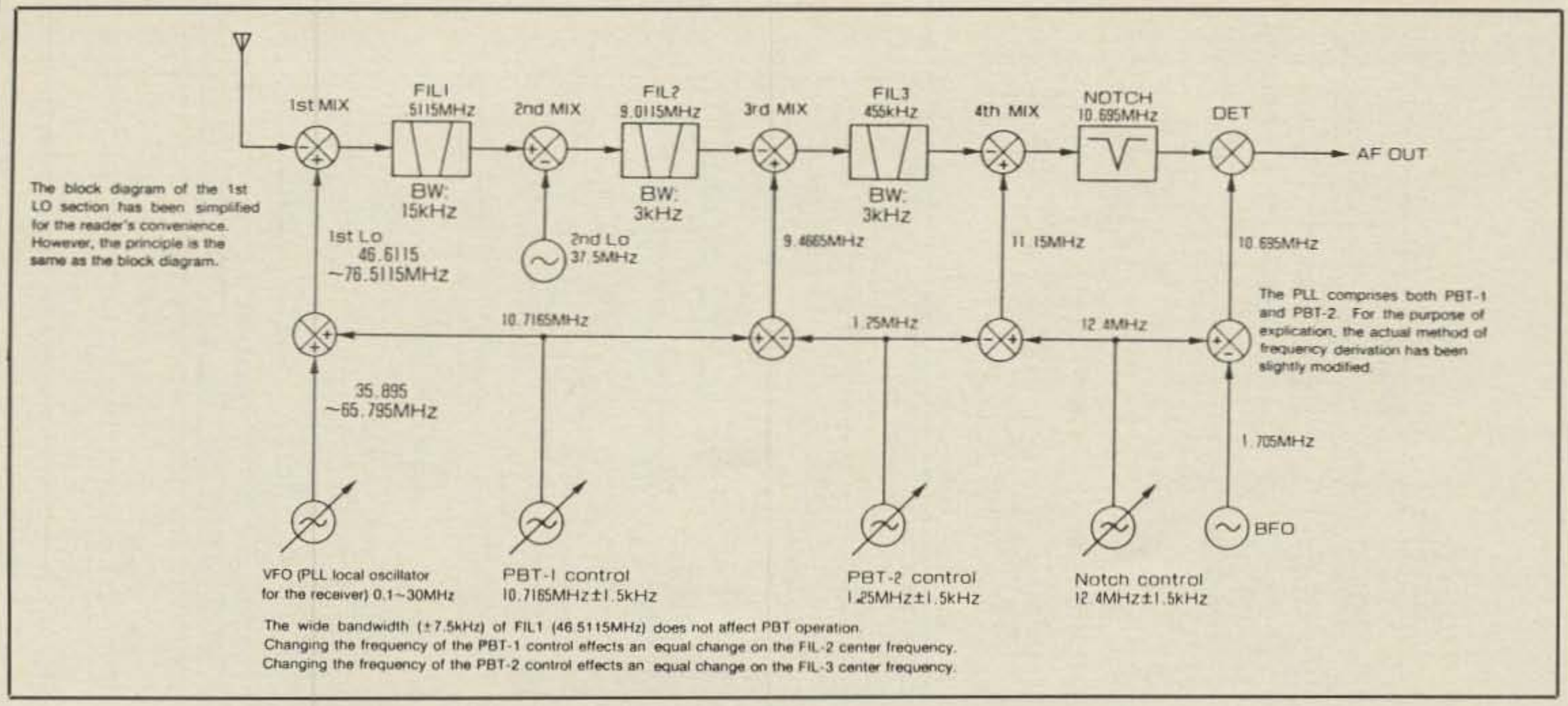

Fig. 1– Simplified block diagram of the IC-781's twin passband tuning system. Discussion in text.

low-pass filter, 10, 20, 30 dB attenuations, and bank of bandpass filters. Notice the PIN diode section that's controlled by AGC voltage—an impressive innovation. Both the RF preamp and the twin first mixers demand special compliments for their high gain, low noise, and wide dynamic-range designs. The IC-781 really shines in these areas. All three circuits use low-noise FETs in a push-pull and balanced-against-ground arrangement. As a simple means of explanation, visualize it in the same way twin lead connects to a television's RF input. Signals are transferred or induced into a TV's input coil as voltage difference between two wires, and "ground" is ignored. Noise induces equally in those two wires with respect to ground. Since the TV's input coil is center-tapped to ground, voltage on each lead-in wire is opposite in polarity with respect to ground and is cancelled. Full signal voltage, no noise.

Continuing, FET types in these stages were selected for their low-noise figures and wide dynamic range. The fantastic results are receiver sensitivity of .16 μV in amateur bands with 105 dB dynamic range, and it drops only to 103 dB when the preamp is switched on. Talk about enough sensitivity to hear rain falling on a leaf in Africa! Whew!

If you are still with me (or getting up from the floor aghast), notice there are *two* first mixers in fig. 2. That's not all. Each one also receives its frequency-tuning/local oscillator signal from a separate frequency synthesizer. That's the Dual Watch/simultaneous dual receive! Pin diode stages again combine this output to the second IF. There must be a quarter-million components inside the IC-781!

Let's now move to the IC-781's overall block diagram in fig. 3, highlight more features, and visualize how all stages operate in tandem. We will begin in the right top area and follow a received signal from the antenna socket to the speaker. The signal first passes through the tuner, then through a rear-panel jumper that can be used for connecting separate receive and transmit antennas. Continue following that signal's path through the 10/20 dB attenuators, bank of filters, PIN AGC (D18, D19), through the balanced RF preamp (Q13 and Q14), and to the paralleled output line driving Q304 and Q404. These proceed to the dual first mixers, Q402/Q403 and Q302/Q303 for Dual Watch. Trace their injection signal lines (in the

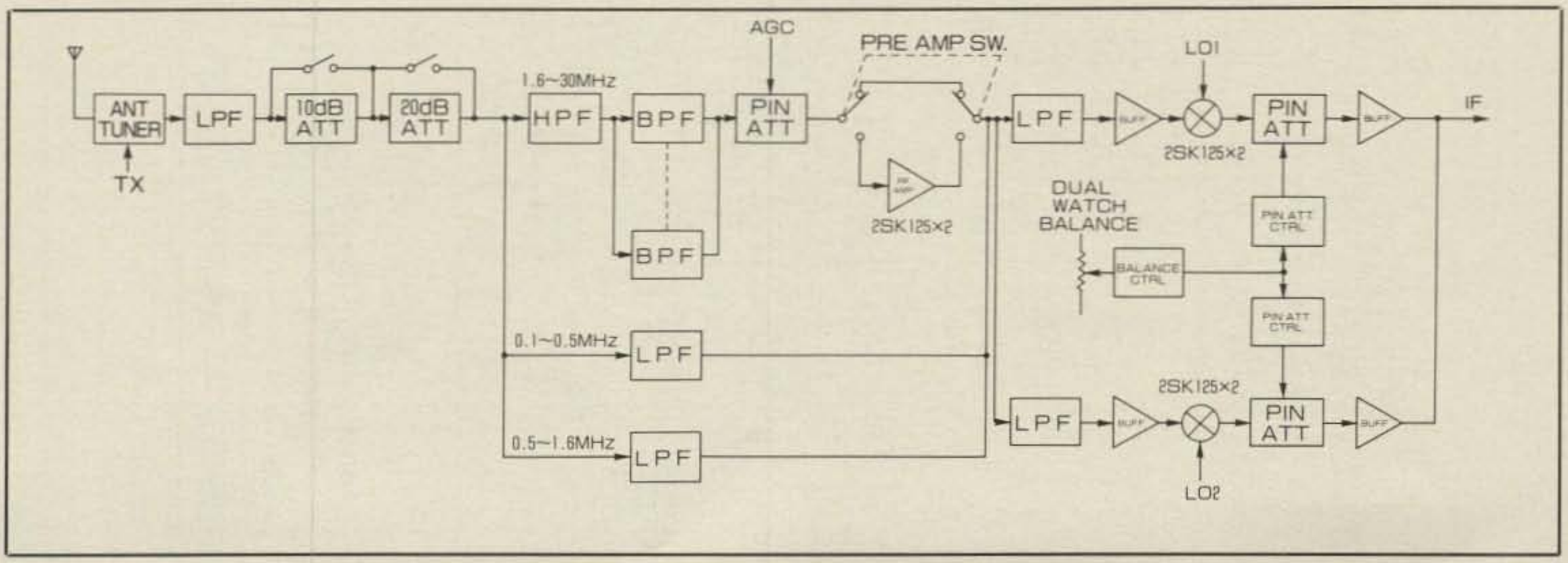

Fig. 2– Simplified block diagram of "front end" designs and Dual Watch system in the IC-781.

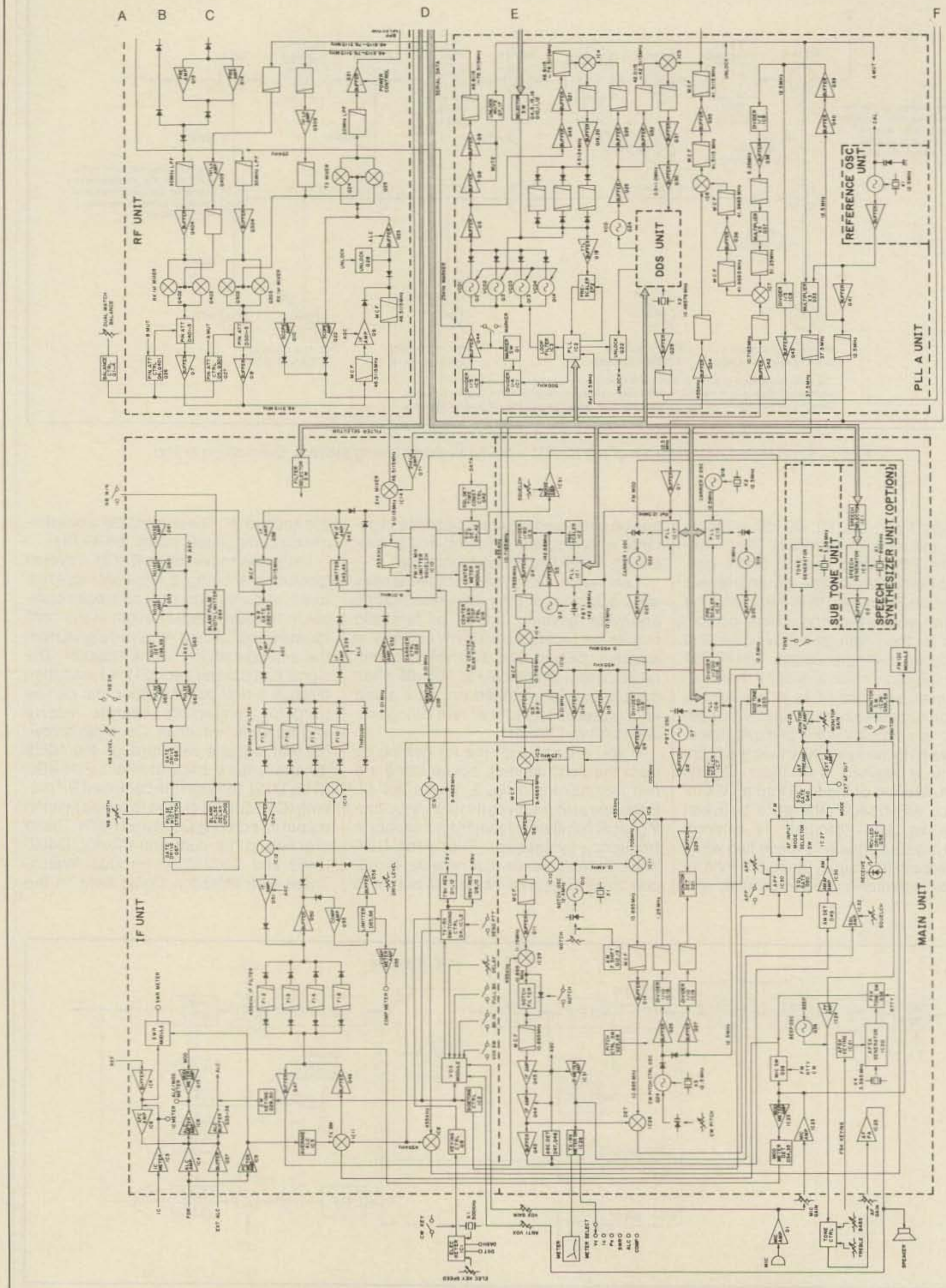

Fig. 3– Overall block diagram of the IC-781. Follow our text discussion of receive and transmit paths. Several interesting features are highlighted during that tour.

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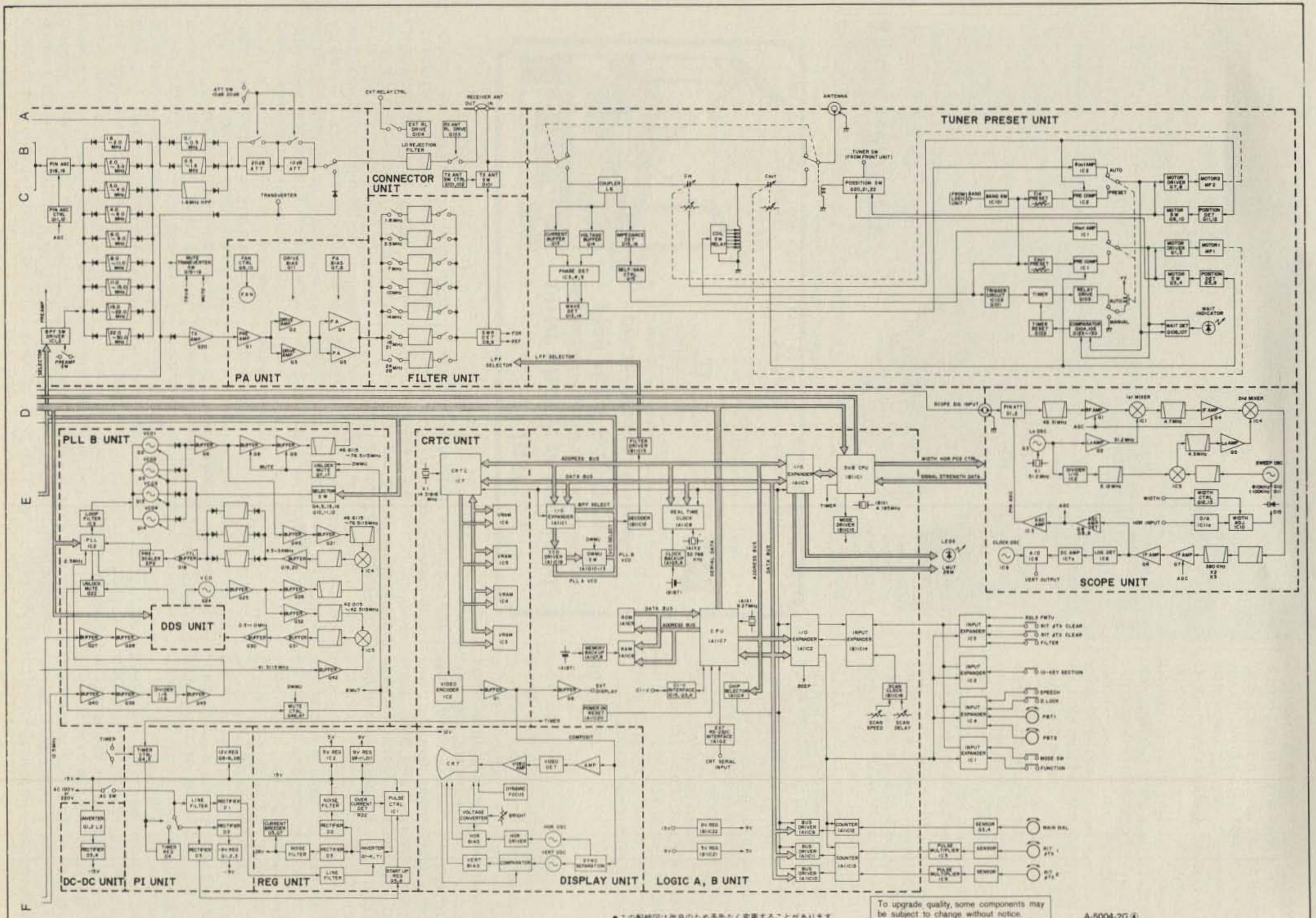

To upgrade quality, some components may be subject to change without notice.

●この配線図は改良のため予告なく変更することがあります。

A-5004-2G④

middle of each mixer); and you'll see one comes from PLL A and one from PLL B. Selection of which PLL/synthesizer is tuned via the rig's main knob is made by pressing the IC-781's VFO A/VFO B buttons. Notice you can leave one VFO operating the transceiver while you set the other one to a new frequency.

Continuing from the dual first mixers, follow their combined output (from Q7 and Q8) "down," through IF amplifier Q9, "left" to second mixer IC-14, and "up" through Q58. Notice the 9 MHz MCF filter at this point. It's for the noise blanker (a clever new idea!). It prevents adjacent QRM from "buckshoting" noise-blanker action. Study all the circuitry above the NB gate—a quite elaborate blanker, indeed! Continue on through the "main" 9 MHz filters FL5 through FL10, mixer IC-12, 455 kHz filters FL2 through FL8, to Q47, and "down" to IC-29. Proceed through the Notch Filter and Q45, 44, 43; "down" to IC-30 Audio Peak Filter; through IC-27 and Q40; "down and around" to IC-24, IC-25; and to the speaker. Now scan back and look at all the fancy frills along that path. Wow!

Looking at the diagram's left bottom, let's now trek from the microphone to the antenna. Audio is applied to Q1, then IC-23, through Q38, and "up" to IC-11—the balance modulator (drop the carrier). Continue through Q46 and the 455 kHz filters (exit one undesired sideband). Proceed through Q50 and note the RF speech processor of Q53, D65, D66, and Q56. Move on through mixer IC-13, the 9 MHz filters, Q39, second mixer IC-14, Q23, and balanced mixers Q24/Q25. ICOM's low-noise circuit designs are even being integrated in transmitter stages for a super clean on-the-air signal. Beautiful! Continue through Q21 to Q20, the push-pull drivers Q2/Q3, the "finals" Q4/Q5, filters, tuner (if activated), and the antenna. Drivers Q2 and Q3 are whoppers—MRF 486's running 40 watts output each(!) and driving another pair of MRF 486 finals to 150 (conservative!) watts output. Whew! The finals are operated at 30 volts for excellent quality and low distortion. Two crossflow fans are mounted on the rig's rear panel for cooling. They work like a bandit. The '781 will deliver full output for . . . well, their chart runs off the page at 5 hours, and I do not have more time than that to calculate its "drop-off" time!

I don't know how to tell you this, gang, but we've only hit the high points of this rig. We had best encourage you to study all the block diagram's additional features yourself, or magazine space will not be available for other articles and contest information. I must mention one final point regarding the IC-781's dual VFOs, however. Each of their related PLLs (A and B units) includes an array of special filters to totally eliminate any phase noise, along with two custom-designed direct digital synthesizer units. This combination results in the most phase-clean injection signal yet. The DDS system also produces the fastest T/R switching speed in amateur radio. I know all this sounds like I have gone cuckoo, but I'm just being honest. Wait until *you* operate an IC-781. You'll see!

On The Air

In my opinion, getting behind the controls of an IC-781 is like piloting a starship across the universe. It's the excitement of working two bands at once, dynamic operating with 100 VFOs, using numerous filters, and walking through QRM like it is not even there. I have used numerous transceivers of all types and models, but the '781 is something else.

Simultaneous dual receive is fantastic. While talking with friends on 20 meters and watching the spectrum scope to see what's happening elsewhere on the band, I adjust the balance control and check 15 or 30 meter action. A quick tap on the **Change** button, and I can call a DX station on 15, then return to the 20 meter QSO while listening for the 15 meter reply. On CW I use full break-in and run DX QSOs at once. Then, too, listening in on underworld activities operating strange frequencies while simultaneously tuning amateur bands is a blast.

The IC-781's wide and narrow SSB filters are great for "face changes" to fit your operating mood. The 2.8 kHz bandwidth gives beautiful audio when QRM is low. It reminds me of classic Collins quality (back when they used 3.1 kHz mechanical filters). A big speaker "brings out" its rich sound. The 2.4 kHz filter makes a fairly noticeable difference, sacrificing quality for QRM immunity. When the going gets tough, the double passband tuning will cut the QRM like very narrow SSB filters, and the IF notch can be swung into action against "side QRM."

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"rapid fire" style, I often use the 2.4 kHz filter and narrow the bandwidth as I go along using the dual passband tuning. The 500 Hz filter and maybe one of the 250 Hz filters are occasionally "punched in" during pileups to copy a DX station's reply when U.S. callers continue covering him up. Using both 250 Hz filters at once is slightly too much selectivity for me, personally. It's like tunnel vision, and your receive frequency must be tuned exactly (steep filter skirts). I prefer hearing a bit of "side noise" to overview the competition. One thing's undeniable, however: The IC-781 has more artillery than you could ever wish for in a big rig!

The transceiver's super-fast CW break-in and variable AGC are great. After you become comfortable with full QSK, you will notice its advantage of hearing between key-downs really does increase DXing success and contest QSO counts. I like the IC-781's QSK because it does not exhibit "relay noise" found in many rigs. Add its 150 watts RF output, and it's a doggone good "barefoot" DXing rig. Needless to say, the IF notch and audio peak filters work like a bandit on CW. In fact, all of the IC-781's "artillery" really does make it possible to copy some QRM-buried DX stations that are right at the hopeless borderline on other transceivers.

If your QTH is similar to mine, you are continuously looking for good noise reduction systems and techniques. I have used double-shielded coax, beam directivity, buried antennas, IF notch circuits, and all types of noise blankers to minimize "rotten QRN." While no one answer is universal, the IC-781's dual and fully adjustable blankers beat anything I have used.

What else can I say without sounding like I'm heading to the funny farm (not a bad idea if they have food, a good beam, and I can carry an IC-781). This is obviously a genuine dream rig, so I will simply summarize its features as follows. If you've ever wanted it, imagined it, thought of it, should have thought of it, or might think of it in the future, it's in ICOM's IC-781!

Conclusion

This rig is not low in cost, but ICOM reports they are selling them like hotcakes. Evidently our quest for the best exceeds our logic for conservative savings. Makes sense. Life is a "one shot deal," and I can say from true childhood experience that pleasures unnecessarily lost can never be regained. Enjoy today while everything is beautiful. If you can wrangle a '781, go for it! You can't go wrong. ICOM stands solidly behind it with a year's full warranty and a fabulous customer support program. For more information, contact ICOM America, Inc., 2380 116th Avenue, N.E., Bellevue, WA 98004.

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CIRCLE 51 ON READER SERVICE CARD

Sometimes a mini-DXpedition can combine two hobbies. Here WA3CUC combines his hobby of hunting with putting Routte County on the air.

Hunting The Rare One

BY HENRY HILL*, WA3CUC

Spinning the dial on one of my favorite HF rigs and listening for that rare DX station or an old friend is one of my favorite ways to enjoy life here on earth.

Like most amateurs, I do have other hobbies. Hunting is a biggie for me. Camping under the stars with a fire going always brings back warm memories of times gone by, and my hunting partners are also my hamming buddies.

Just about the time my back started aching from all the heavy tube gear I was carrying out of the hamfest fleamarket, one of my two hobby buddies, Rick, KCØHH, came up with a great idea. Why not mix both hobbies this year and take our HF gear hunting with us! That was the start of one of our most rewarding hunts yet. Little did I know then that my checking account would be depleted to rock bottom, with my XYL (WB3DZI) tapping CQ in code on top of my head with a box full of old Heathkit parts!

First of all, I needed a portable rig—then a portable antenna, power source, and a good week's supply of 807s. The rig was an easy choice—a brand spanking new ICOM 735. The ICOM was small and had all the features I wanted in a portable rig, although there are a lot of other great portable rigs out there that would have done the job, too.

The next decision, an antenna, wasn't as easy. It caused me a lot of mental SWR, feedback and off-frequency thoughts. I did a lot of research and talked to the antenna experts (self-proclaimed) on various HF bands. I was finally able to make a decision after many a sleepless night, and I bought an Isotron.

The Isotron was the ticket. It's a great little portable antenna. The size is small, and the weight is light. I purchased three different Isotrons for 20, 40 and 75 meters. All three fit on my 30 foot mast very neatly.

The elk season here in Colorado finally came. After four hours of hard work we finally got all three trucks loaded with all of our gear! After an additional five hours of driving through some of the most beautiful mountains in the country, we arrived at our new home for the next two weeks.

As we were putting up the tent snow started falling, letting us know that winter had slipped up on us again. The tent went up easily, as did the mast with three Isotrons sitting at 30 feet overlooking one of the prettiest valleys in the state of Colorado.

The first day was a killer. Everyone came back to camp dead tired. The stove was putting out plenty of heat, and I was ready to go on the air. My first CQ was a winner. A W1 came back and we had a nice QSO. From that point on the rig and antennas were working like a dream.

We found the Isotron to be the perfect portable antenna. It put out a good signal and had a nice low SWR when tuned properly. The 40 and 75 models worked to-

The author is straightening out the feed cables just after the antennas were raised.

Working in cold weather, the crew assembles the Isotron antennas.

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CIRCLE 169 ON READER SERVICE CARD

The operating tent/living quarters for the group. The antennas are about 30 feet up.

gether on the same feedline. We had to feed the 20 meter model with a separate feedline. We worked 30 states in the first few hours on the air. A lot of contacts were made by Larry, KAØRXF, on the County Hunters Net. We were in a rare county (Routte) and contacts came easily. The ICOM was fed by two large, deep-cycle car batteries. The batteries lasted the whole trip. We also put a ground plane on the mast above the Isotrons for 2 meters.

This trip will always be a bright spot in my memory. It was lots of fun. The pictures were taken by Larry Harwood, KØRXF. Combining both hobbies was a great idea. I can't wait until next elk season. Maybe next year all of us at our hunting camp will have the pleasure of working you! CQ

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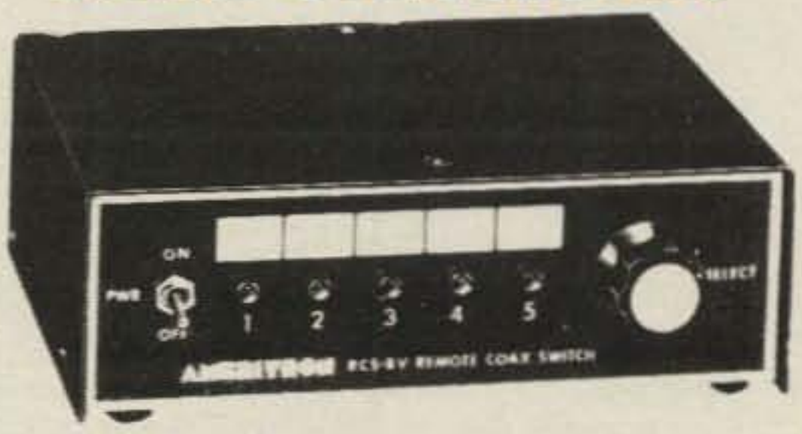

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CIRCLE 29 ON READER SERVICE CARD

Call letters on auto license plates sometimes say more than your location. It may become something to live up to or live down.

Unusual Call Signs

BY BRIAN D. SMITH*, KA9OIH

Joe Ratkiewicz's amateur radio ticket once helped him avert a speeding ticket. Sidney X. Shore's old amateur call sign brought him VIP treatment, but the new call prompts women in passing cars to blow kisses at him. Betty F. Hayden, meanwhile, once had to convince a clerk that her call sign wasn't too lewd to grace an automobile license plate.

These tales probably seem strange to most of us amateur radio operators, but then most of us have calls with nonsensical letter combinations. We render our unremarkable calls unforgettable by conjuring up imaginative phrases. KA9OIH becomes "KA9-Old Indiana Hoosier," KT9M is "King Tut-9-Mummy," and WA9RAP is transformed into "Whiskey After 9 Relieves All Pain."

Amateurs such as Ratkiewicz, Shore, and Hayden, however, have no need for imaginative wordplay. Their calls are funny enough by themselves, and for most of them the "comedian" who bestowed the call sign was dear old Uncle Sam.

Yes, this is the story of the poor souls whose calls you and I giggle at as we scribble them down in our logbooks.

As Ratkiewicz, N0EL, has discovered, a humorous call sign is not necessarily a curse, especially on an automobile license plate. "Driving through Wyoming on my way to prospect in Utah," he recalls, "I was stopped for speeding—85 mph. The cop took one look at the N0EL and asked me what it was. I told him, whereupon he, also an amateur, said he could not give Santa a ticket." As the saying goes, he who laughs last . . . .

Shore, K1SS, selected his alluring call when the FCC honored "you pick 'em" requests. Since his initials are SS, the call sign wasn't merely his attempt to be romantic. But the average motorist doesn't know the difference. "Since my call sign is on my license plates, it sometimes sparks a pretty girl who reads it to throw me a kiss," he notes.

Hayden had some explaining to do the day she tried to purchase a license plate bearing her call sign. "When I applied for personalized plates, the woman at the Department of Motor Vehicles first thought we were joking and then thought it could be considered off-color." An off-color call sign? Hayden, KB6BRA, is used to snickers and double-takes. (And yes, she eventually got her personalized license plate, but only after she produced her amateur radio license.)

While the newer radio calls have their corkers (Among the best are Stephen E. Graham's N0FUN and Charlie Hunt's N0BUL.), it's a tough to beat the traditional 1-by-3 and 1-by-2 W/K calls. Let's face it; for sheer entertainment value the NA8s, KR9s, and AA0s can't hold a candle to K1 and W1, K0 and W0, and especially K9.

Consider the memorable call of Charlie Calhoun, W0RRY. "I'm a quality assurance engineer with a major aerospace firm," he explains, "so W0RRY is a good call."

Moreover, unusual call signs offer rich possibilities for QSL design. Ratkiewicz's N0EL card is trimmed with icicles. The QSL of Warner "Red" Ellinwood, W1MPY, portrays Popeye's old hamburger-chomping friend "Wimpy" at the key. Lou Linthecome's pasteboard features a dog with its snout in a food dish. Why? Because Linthecome's call sign is K9EAT! Shore, a publisher whose letterhead bears the inscription "Creativity in Action," obviously takes his creativity seriously. His K1SS card is one of the sexiest around, with six fiery-red lip prints surrounding his call sign. The story behind the card? "I asked my printer's secretary, a lovely young lady, to rouge up her lips and to kiss a piece of chromecoat paper for me several times," Shore explains. "We then selected the 'lips' that were juciest, and you can see them plastered all over my QSL card."

Shore's current call sign may have spawned a classic QSL, but his previous call, the unspectacular K2FC, was more beneficial. "One day while looking for a parking lot in Manhattan, I happened to notice an area on the street free from cars," he says. "There on a post was a blue sign announcing that this side of the street was reserved for diplomatic cars with license plates DPL or FC. FC means Foreign Consulate. "My license plate had an FC on it, so I pulled into that space and parked the car. When I got out of the car, a New York City policeman greeted me with a salute of the hand, a big smile and a loud hello!" says Shore. "From that moment on I never worried about a parking spot in Manhattan. Just to make sure, I carried a Japanese-English dictionary with large letters on the cover to leave on the passenger side of the front seat."

Shore can't park for free now, but he doesn't seem to mind. "I will go to the crematorium holding my K1SS call!" he vows.

Many other amateurs with bizarre call signs agree. "I wouldn't even consider changing (calls) right now," says Hayden, KB6BRA. "I take a lot of ribbing on the air, but I remind people that my call sign is more functional to me than a QPJ or XLZ."

However, not all "funny" call signs are considered so by their owners. "I was embarrassed when I first got it," says Henry Gwillim, W7LID. "I would always imagine the other amateurs saying, 'There's that lid again.' I don't care for the jokes about it, and I guess it has kept me from being as active as I could have been."

Remember W7LID the next time you're tempted to laugh at someone else's offbeat call sign. Remind yourself, "There, but for the grace of the FCC, go I."

And if you should ever be stopped for speeding, keep this in mind: Somewhere out in radioland, Joe N0EL Ratkiewicz may be laughing back. CQ

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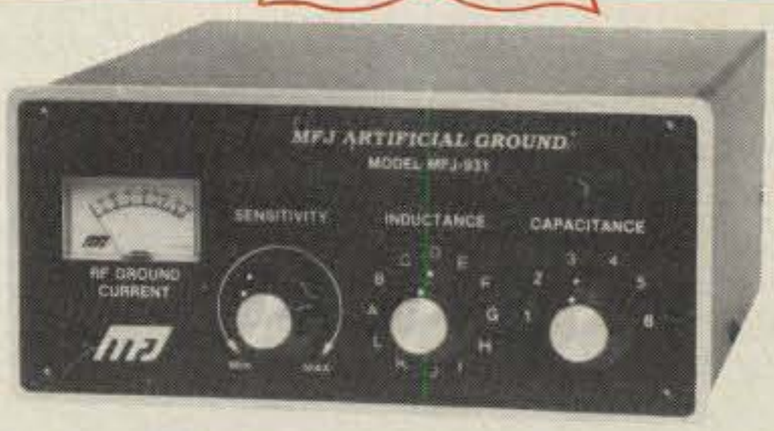

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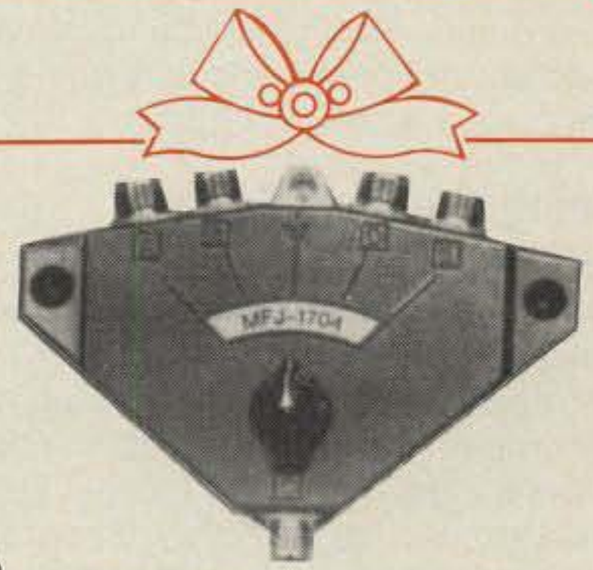

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No-45-46

A voltaic transplant may save that battery pack's life. KA1PJQ comes up with some helpful ideas on how to breathe more life into moribund nickle-cadmium packs.

CPR for Dead HT Batteries

BY NEIL LEWBEL*, KA1PJQ

Most hams who own HT's eventually develop a collection of dead nickle-cadmium battery packs. Nickle-cadmiums are fine batteries when they work, but they do have a limited life. Many articles have been written on how to get the most out of nickle-cadmium batteries. The unfortunate truth is that they do eventually die as a result of normal use, over-charging, under-charging, shorts inside the battery pack, and other problems.

If you're like many other hams, you have saved these dead battery packs in the hope you could some day bring them back to life or otherwise use the parts. Now is your chance to save some of those batteries or at least use the parts. Chances are that you'll also save some money that you were planning to spend on new battery packs, power supplies and accessories for your HT.

The projects and modifications described here are specifically for the Kenwood TR-2500 and TR-2600. Similar modifications are possible with battery packs used in other HT's.

The big money saver is to combine two dead batteries and end up with one good nickle-cadmium battery pack and a handful of spare parts which can be used for other projects. To do this you must open the bad battery packs and determine the condition of the cells and parts.

Opening The Dead Battery

To open the shell, grip each half of the shell with your hands. Hold the shell with your forefingers on the bottom and your thumbs on the top. First, press down with one thumb on the area marked A in fig. 1 and gently pull the two halves apart. When this part of the shell separates slightly, move to the other side and press down on the area marked B in fig. 1 and again gently pull the two halves apart.

This process of separating the two haves of the shell takes some experimenting and some time, so be patient and careful. If you have trouble with this try moving your thumb to a slightly different position and repeat the procedure.

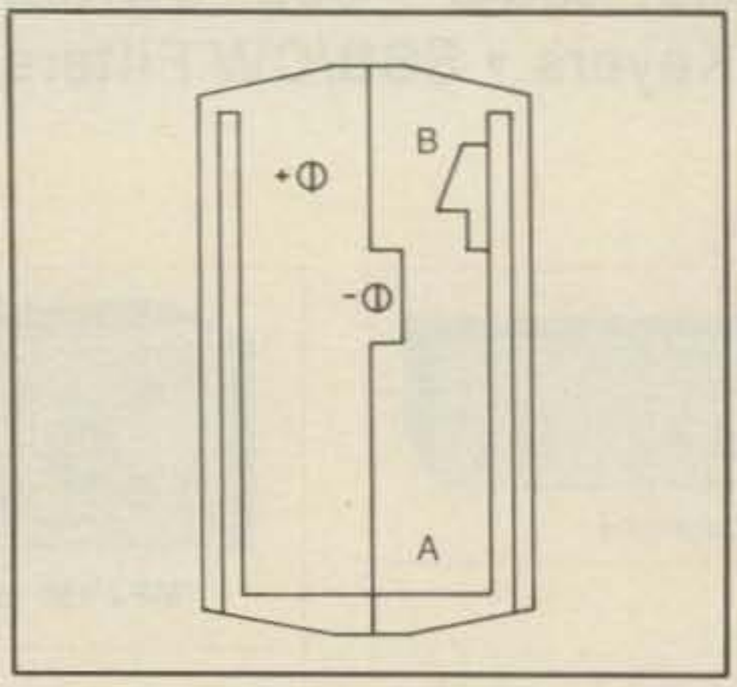

Fig. 1—To open the bad battery pack, hold one half in each hand and press slightly on the areas marked A and B, while pulling the two halves apart.

Testing The Components

When the shell is opened the battery cells should be gently removed, as a unit, from the shell. The battery cells are connected to the circuit board inside the shell by wires that are about 3 inches long. When removing the battery cells be careful not to break these wires. Also be careful not to short these wires together. Now it is time to locate any problems and assess the condition of the battery pack. First, check for broken wires, especially the wires to the battery cells and the wires to the power terminals on top of the shell. Also check for burned wiring. A short circuit across the battery terminals can produce a very high current. This, in turn, can cause the internal wires to burn or melt.

After checking the wiring, look at the cells. There will be one short and three long units. The longer units each contain two cells. The voltage across each of the long packages should be about 2.4 V. There should be about 1.2 V across the short unit, which is only one cell. These voltages are correct for a charged battery. Voltages in a battery that is not charged may be somewhat less. However, the voltages on each of the long units should be the same. The voltage on the short package should be one half that of the long ones. A bad cell will have a voltage lower than the other cells. A cell with reversed polarity is also bad.

If the wiring and nickle-cadmium cells are all good you may want to check the components on the circuit board. To remove the circuit board from the shell, remove the two phillips head screws that hold the board in place. These two screws can be seen through two holes in the board; one on the side and one in the center. Then remove the four screws from the bottom of the shell. Now you can remove the circuit board. Lift the circuit board, the charging receptacle and the small micro switch out of the shell.

The microswitch, which is revealed when the circuit board is lifted, lifts straight up. If the microswitch does not lift out easily, push the microswitch button through the bottom of the shell. Be careful not to break the shell as you remove the microswitch, charging receptacle and circuit board.

Take another bad battery pack and repeat the above procedures for opening the shell and checking the components and cells.

Create a Good Battery

The next step takes some ingenuity. You must determine if there are enough good components and cells to reconstruct one good battery pack. I worked on two bad battery packs. One had two bad cells. The other had wiring and components that were burned due to a short circuit. I took the good cells from the pack with burned wiring and soldered them into the pack with the bad cells. In this instance it was easier to simply solder all the cells and the thermal switch (located

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You can transmit and receive 7 bit ASCII using the same shifts and speeds as in the RTTY mode.

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You get a Super Morse Keyboard mode that lets you send and receive CW effortlessly, including all prosigns -- it's tailor-made for traffic handlers.

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You'll score valuable contest points by completing QSOs so fast you'll leave your competition behind. And you can snag rare DX by slipping in so quickly you'll catch everyone by surprise.

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MFJ-949C

$139.95

Made in U.S.A.

The MFJ-949C gives you more precise matches than any tuner that uses two tapped inductors. Why? Because you get two *continuously* variable capacitors that give you infinitely more positions than the *limited* number on switched coils.

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You get an MFJ tuner that has earned a reputation for being able to match just about anything -- one that is highly perfected and has years of *proven* reliability.

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You get an extremely versatile 6-position antenna switch for selecting 2 coax lines (direct or through tuner), random wire or balanced line and dummy load.

Plus . . . a highly efficient airwound inductor gives you plenty of matching range and less losses for more power out into your antenna, 1000-volt tuning capacitors and heavy duty switches to give you arc-free no worries operation; you get a beautiful black all aluminum cabinet with a brushed aluminum front panel and a compact (10 x 3 x 7 inches) size that fits right into your station. Under many conditions you get a bandpass characteristic that attenuates harmonics.

You can run up to 300 watts PEP RF output and match coax, balanced lines or random wires *continuously* from 1.8 through 30 MHz. Use it to tune out SWR on dipoles, vees, long wires, verticals, whips, beams and quads.

High efficiency *and* a compact size: *performance* is most important

You get maximum efficiency *and* a compact size because the MFJ-949C uses only *one* airwound coil with a large diameter. Using only one coil takes up a minimum of space and there's no mutual coupling problems.

The excellent form factor of the short fat coil gives you highest Q. Plus you get plenty of inductance for the widest matching range possible.

The airwound inductor is mounted vertically and centered between the two variable capacitors as far from metal surfaces as possible with the bottom end grounded to the cabinet.

This results in a highly efficient tuner that puts maximum power into your antenna *and* a compact size that complements your rig and fits right into your station.

Tuners using *two* tapped inductors *need* a large cabinet not just to house the coils but also to help reduce coupling between the inductors.

What's really important

What's really important is a tuner's ability to get your SWR down to a minimum. The two *continuously* variable capacitors in the MFJ-949C give you the *precise* control you need for minimum SWR. Plenty of inductance gives you the widest matching range possible.

One year *unconditional* guarantee

You get a *full one year unconditional guarantee*. That means we will repair or replace your tuner (at our option) *no matter what* for a full year.

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The MFJ-949C performance record: precise control for minimum SWR

Get the tuner that gives you two *continuously* variable capacitors so you'll get more precise control for minimum SWR and more power into your antenna.

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The keyer mounts on a Bencher paddle to form a small (4 1/8 x 2 5/8 x 5½ inches) attractive combination that is a pleasure to look at and use.

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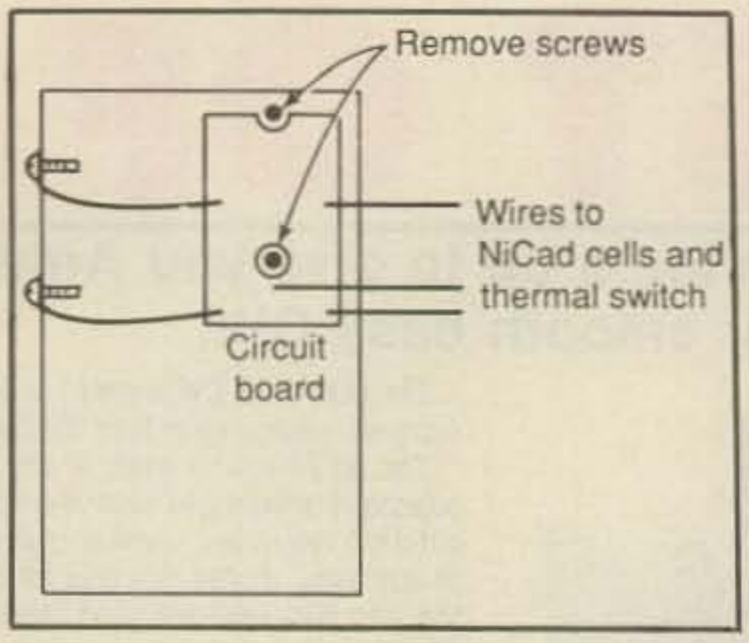


Fig. 2—After removing the nickle-cadmium cells, you may want to remove the circuit board. To remove the circuit board and microswitch, remove the two screws indicated here and the four screws on the bottom of the shell.

between the cells) into the new unit. Replacing all the cells in this manner involves soldering three wires—two from the cells and one from the thermal switch.

There are a number of other possibilities that should be considered depending on which and how many cells and/or components are bad. If the wiring is burned but the cells and components are still good, you may simply want to solder in replacement wires. If you do this be sure to replace one wire at a time and solder both ends in place before going to the next wire.

If you have more than two bad battery packs you may want to try soldering in individual cells or pairs of cells to create two good packs from three bad ones. If you choose to solder individual cells, be careful. Too much heat can ruin the cell. Over heating the cell can cause it to explode. The cells are connected with small metal straps. you may want to try soldering these straps together, instead of soldering directly to the cells.

If the cells and wiring are all good, check the diodes and other components. If there is a bad component it can be easily replaced when the circuit board is out of the pack.

After you have repaired the battery pack it must be reassembled. First install the microswitch. Next put the circuit board in place. Then install the four screws in the bottom and the two screws through the circuit board. Now put the cells into position. The final step is to snap the two parts of the shell together.

Build a Dry Cell Supply

The remaining shell can be used to make a conversion unit that allows the HT to be powered by dry cell battery packs. These packs may use AA or C or D cells in place of the nickle-cadmium battery pack. These are especially useful for emergency or field operations, where the time and facilities for recharging nickle-cadmium batteries may not exist.

Cut the yellow and black wires (from the battery contacts) about a quarter of an inch from the circuit board. Put the circuit board assembly in a safe place.

Carefully remove the screw marked + on top of the shell. Be very careful not to lose the screw or the solder tab, which are both very small. Gently remove the solder tab from inside the top of the shell. This is the tab that the screw was connected to. Hold the tab with needle nose pliers or forceps. Then using a soldering pencil remove the black wire. Solder about 5 inches of a slightly heavier gauge of wire onto the tab. Solder the other end of this wire to the body (ring) connection of a miniature phone jack (Radio Shack # 274251A). Screw the tab back into the top of the shell at the hole marked +.

Then remove the screw and tab marked −. Unsolder the yellow wire. Solder another 5 inch piece of wire onto this tab. Put the screw and tab back in place at the hole marked −. Solder the other end of this wire to the end (tip) connection of the miniature phone jack.

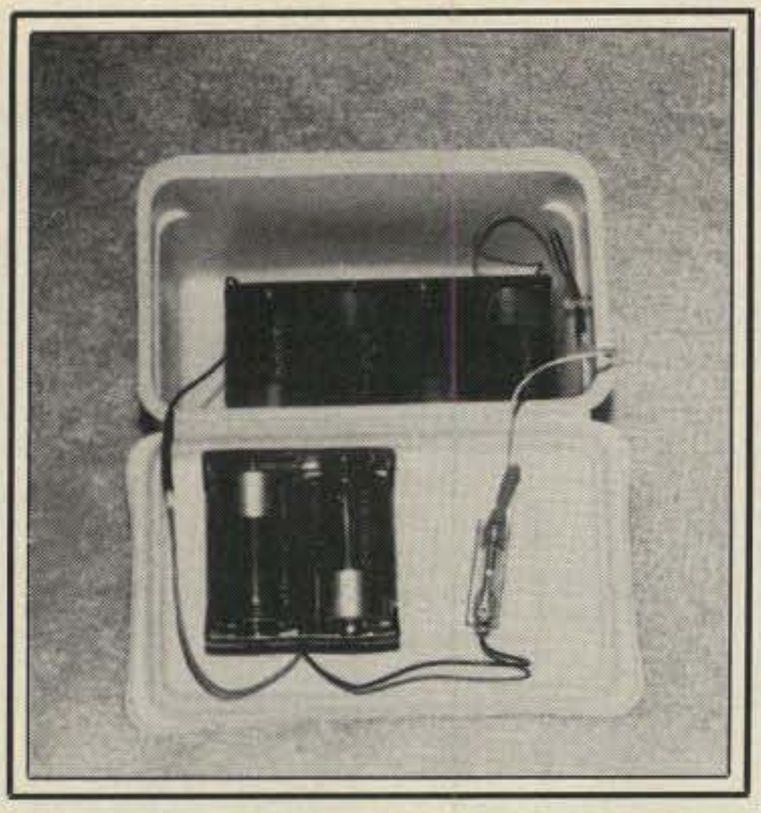
Install the phone jack in the hole where the charging receptacle was. Put a small dot of silicon sealant over both tabs, making sure to cover the threads of the screws and the solder joint. This will help to hold the tabs and battery contact screws in place. Do not put any sealant on the heads of the screws. When the silicone dries, close to two halves of the shell. The first step of this project is now complete.

Now it is time to build a battery box. Take a plastic box (I used Radio Shack part # 270-222) and drill a 15/64 hole in the side of the box. Take an 8 cell AA battery holder (which fits in the project box, and connect the positive lead (usually red) to the body (ring) connection of a miniature phone jack. This is another jack similar to the one described above (Radio Shack #274251A). Connect the negative lead to the end (tip) connection of the jack.

Solder a jumper wire across the spaces for two cells in the battery holder. A suggestion is to solder the wire to the springs used for battery contact. This will make the battery holder a 6 cell unit.

Install the miniature phone jack in the hole in the side of the project box. Glue a few pieces of foam rubber into the project box around the phone jack. This is to prevent the battery pack from hitting into the phone jack. Install 6 AA cells in the six available spaces of the battery holder. Do not put cells in the two spaces that are bypassed with the jumper wire. You should measure 9 volts at the phone jack when the cells are installed.

Now either buy or build a cable with a miniature phone plug at each end. Connect this cable to the project box and the conversion unit. Test the voltage and polarity at the screws on top of the shell.



A long lasting dry cell pack can be made using six D cells connected to a miniature phone jack. A small fuse may be added to prevent a short circuit from totally draining the battery.

There should be 9 volts with the screw marked + being the positive lead. If the voltage is correct but the polarity is wrong, go back and check your wiring. If the polarity is not correct it can permanently damage the HT. Make sure the polarity matches the positive and negative markings on top of the shell.

When the polarity and voltage are correct, turn off the HT and place the shell in position, as if it were a battery pack. Now turn on the HT. First try receiving. Then try transmitting. You now have a battery pack that can be used when there is no facility for recharging nickle-cadmiums.

If you want a dry cell battery pack that lasts a long time, make another battery pack that uses six D cells. Since six cell holders are not easy to find, I used a four cell holder wired in series with a two cell holder. I mounted both battery holders in a plastic box that originally contained cleaning pads for infants. Since the box is made of very thin plastic, it was very easy to drill the holes needed to mount the D cell holders. Two screws and nuts are enough to mount each D cell holder in the case.

An optional fuse may be put in series with the D cells. This fuse is to protect the batteries , not the HT. The fuse will prevent a short in the wiring from draining and ruining the batteries. This fuse should be about 1A. To finish this battery pack connect a miniature phone jack into the battery circuit. Use the same polarity as on the earlier pack: positive to the body (ring) and negative to the end (tip). This D cell pack uses the same cable as the earlier pack. It should be tested for polarity (in the same way as the AA battery pack) as described above.

There are several other possible accessories you can design and build. One such accessory is an automobile power supply than converts the 12 volt car power to between 8.4 and 9 volts. If you build this power supply, make sure the output voltage is well regulated at 9 volts or less. Then connect it to the conversion unit and test that the correct voltage and polarity are present at the contacts on top of the conversion unit.

Another possibility is to build a house power unit that powers the HT from the 110 volt house power. Once again make sure the output is well regulated at 9 volts or less. Then check the phone plug and conversion unit contacts for proper voltage and polarity.

There are probably other projects that can make use of dead battery packs. However the projects described here are simple and can save you quite a bit of money, when compared to the price of a new nickle-cadmium battery and a dry cell pack. CQ

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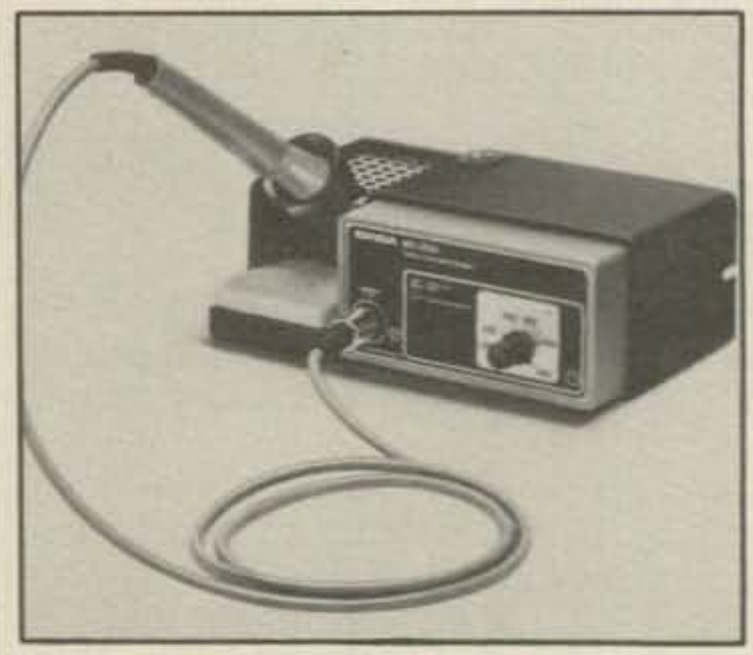
The Code:Red Emergency Battery is a new type of D cell that has a guaranteed shelf life of at least 20 years. It features a unique twist top that activates the cell's chemical reaction. Once activated, the shelf life of the Code:Red cell is equivalent to that of an ordinary heavy-duty zinc-carbon cell, and its power capabilities are greater. Additionally, it contains no deadly mercury; zinc-carbon and alkaline cells contain up to 1,200 mg of mercury which is released into the environment when the cells are disposed of. The suggested retail price of two Code:Red cells is $6.95. More information is available from Energetics, 11959 Northup Way, Bellevue, WA 98005 or circle number 101 on the reader service card.



Versatile Soldering Station

Long a favorite with European amateurs, the ERSA 6000 electronic soldering station is now available in the US. It features a 60VA power supply and the TE 40 soldering iron with a positive temperature coefficient heating element. This makes it suitable for a broad range of applications from the most delicate to those which might otherwise require the use of

a 100W iron. The 6000 provides a virtually constant soldering temperature, even in rapid soldering sequences. Price class is $120. More information is available from Robert W. Mink Import-Export, Inc., PO Box 6437, Fair Haven, NJ 07704 or circle number 102 on the reader service card.

Antenna Tuner Features New Design

MFJ has introduced a new antenna tuner that features a novel twist—or should we say the lack of a twist! The conventional "T" circuit has been modified to use only one dual differential variable capacitor and a roller inductor. With only two tuning knobs to adjust instead of three, the user should find it faster and easier to tune the MFJ-986 than a standard T-match tuner. Rated at 3 kW, the MFJ-986 features a peak-reading dual-needle wattmeter and internal 6-position antenna switch. For those preferring a balanced output, a current balun provides better balance than the conventional voltage balun found in other designs. For more information, contact MFJ, PO Box 494, Mississippi State, MS 39762 or circle number 105 on the reader service card.

All-Mode HF Transceiver

Heath Company has announced the SB-1400 all-mode transceiver covering 1.8 to 30 MHz. It features a continuous-duty 100-watt transmitter (25 W AM) and a general-coverage receiver. Other highlights include dual VFOs, RIT, 500-Hz CW filter, 20 memories and an all-mode receiver squelch. The SB-1400 is sold assembled and is in the $800 price class. For more information, contact the Heath Company, Benton Harbor, MI 49022 or circle number 106 on the reader service card.

the Ultimate Paddle

We Didn't Invent CW, We Only Perfected It.

Discerning CW operators world wide have long recognized the **Bencher Iambic Paddle** as the finest paddle available. You can't find a smoother, more responsive paddle for flawless keying, certain to make your CW operating a real pleasure.

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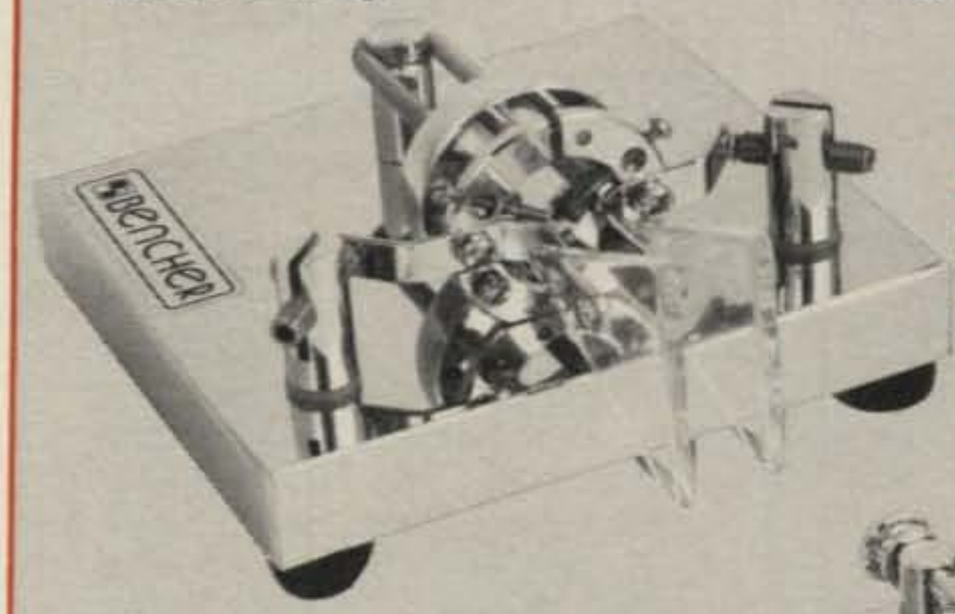

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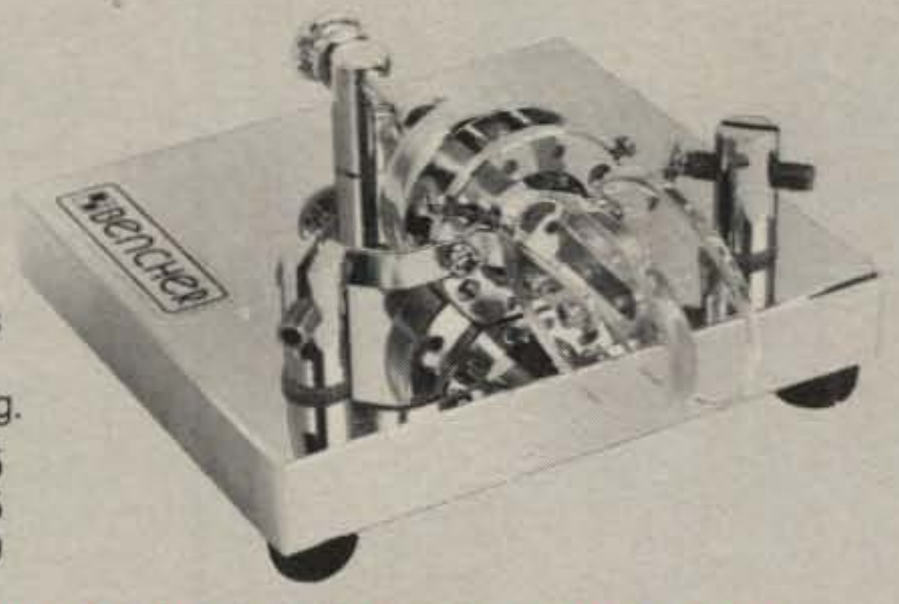

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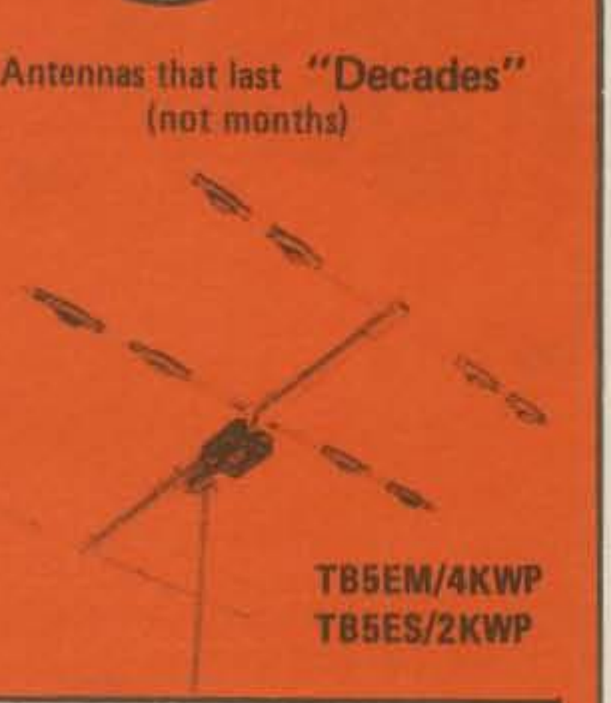

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CIRCLE 81 ON READER SERVICE CARD

Announcing

The 1989 CQ World-Wide 160 Meter DX Contest

CW: January 27–29 **SSB: February 24–26**
Starts: 2200 GMT Fri. **Ends: 1600 GMT Sun.**

Conditions and activity on the 160 meter band are at their maximum. We can expect over 100 active countries on both Phone and CW. Here is your chance to run up your state and country totals in a very short time. The "DX Window" has not been seriously observed for several years. Since many stations could not operate there anyway, the only frequency restrictions are those of your own country. We still encourage Pacific DX to transmit 1907–1912 kHz and specify a listening frequency. W/VE transmission there is counterproductive. Any station can always specify a listening frequency if he so desires.

Classes: Single and multi-operator. Use of a spotting net makes you multi-op.

Exchange: RS(T) and QTH. State for the U.S., areas for Canada, prefix for DX, country abbreviation for those with unusual prefixes.

Stations operating in a state different from that indicated by the call are required to sign portable.

Scoring: Contacts with stations in own country, 2 points. Contacts with stations in other countries in same continent, 5 points. Contacts with stations in other continents, 10 points.

Multiplier: Each U.S. state (48), Canadian area (13), and DX country. Maritime Mobiles separated by at least 100 miles. Canadian areas: VO1, VO2, NB, NS, PEI, VE2, VE3, VE4, VE5, VE6, VE7, NWT, Yukon. KH6 and KL7 are considered countries, but not also states. U.S.A. and Canada may not be counted as country multipliers. Maritime mobile points determined by location. ARRL DXCC and WAE country lists and WAC boundaries are the standards.

Final Score: Total QSO points times the sum of all multipliers (States + VE areas + DX countries + Maritime mobiles).

Penalties: Three additional contacts may be deleted for each unacknowledged duplicate or unverifiable contact removed from the log. A second multiplier may be removed for each one lost by the above action.

Disqualification: You may be disqualified for violation of your country amateur radio regulations, unsportsmanlike conduct, or claiming excessive duplicate or false multiplier contacts. If the corrected score without penalties shrinks more than 3% from that claimed, disqualification will be considered. Disqualified stations or operators may be barred from competing in future *CQ* contests for up to three years.

Awards: Certificates to the top scorers in each class, each state, Canadian area, and DX country. Also the following plaques.

Single Operator

	CW	SSB
World	by K5AAD	by K5AAD
USA	by K4TEA	by K4JRB
Europe	by K4UEE	by N4NX
Africa	by K4SB	by WB4ZNH
S. America	by K4TKM/6	
Asia	by WD4RCO	

Multi-Operator

World	by N4RJ	Southeastern DX Club

The above plaques may be won by the same station every other year. Winner of a world plaque will not also receive a sub-area one. It will go to the runner-up.

Sample log and summary sheets may be obtained from *CQ* by sending a large SASE with sufficient postage to cover your request. You can make up your own, 40 contacts per page, columns for GMT, exchanges, multiplier, and points. Show the multiplier and its sequential number only the first time it is worked.

Include a summary sheet with your entry showing the scoring and other essential information and a signed declaration that all rules have been observed. Mailing deadline for CW entries is February 28, and March 31 for the SSB section.

Send logs to 160 Meter Contest Director Donald McClenon, N4IN, 3075 Florida Avenue, Melbourne, FL 32904 USA. They may also be sent to CQ 160 Meter Contest, 76 North Broadway, Hicksville, NY 11801. Please indicate CW or SSB on the envelope.

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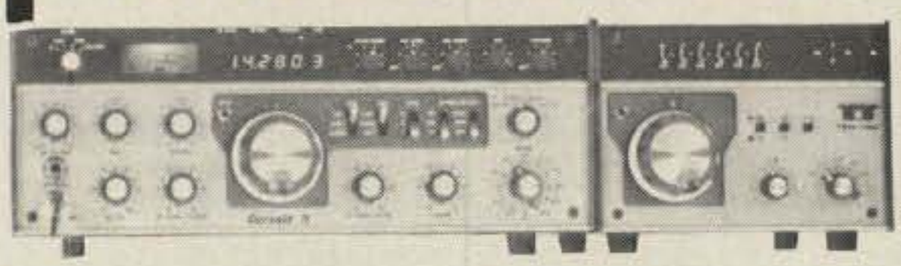

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Washington Readout

a monthly feature by
FREDERICK O. MAIA, W5YI

REGULATORY HAPPENINGS FROM THE WORLD OF AMATEUR RADIO

Conducting Amateur Radio Examinations

It has been some five years since the FCC deregulated Novice license testing by volunteer amateur examiners, and four years since the FCC turned the balance of the testing program over to the amateur community. Our mailbag indicates that many long-time licensed amateurs and newcomers to amateur radio are confused about the details of the two programs. This month let's cover the most commonly asked questions about amateur radio operator testing.

Why do amateur radio operators have to be licensed when CB operators do not? Why is the Morse code required in the United States and not in Japan when both fall under the same international law? Unlicensed and unregulated wireless operators began to appear shortly after Marconi first demonstrated long-distance two-way radio communication around the turn of the century. Their numbers (and power levels) mushroomed to the point where they were generally looked upon as a nuisance by the military and government, who were beginning to see the potential of radio communication.

Licensing and regulation of radio came about as a result of the Radio Act of 1912, when the government, who earlier had been unsuccessful at legislating "wireless" operators out of existence, tried a new method. At the time it was thought that wavelengths shorter than 200 meters were useless for two-way radio communication. The government simply "herded" the private wireless operator into the worthless spectrum "reservation" above 1500 kHz. A provision was made for the Secretary of Commerce to determine the qualifications of wireless operators and to issue them licenses and call letters to operate on the airwaves. Actually, no one had yet really tried the shortwaves.

All wireless radio operation was halted during the first World War, and again the plan was not to allow private radio communications to resume—this time by the U.S. Navy. It too was defeated, and wireless operators once again filled the spectrum. In the early 1920s a Pennsylvania amateur operating from his garage tried something different. Instead of contacting other wireless operators, he transmitted presidential election returns to a few owners of receivers. "Broadcasting" was born.

The Radio Act of 1927 created the Federal Radio Commission, which instituted all sorts of new requirements. Radio services were defined for the first time, interference and power level guidelines were enacted, and "logs" of transmissions were required. The International Telecommunications Convention (the forerunner of the ITU, International Telecommunication Union) adopted worldwide international amateur frequency bands which went into effect in 1929. The American wireless operator no longer had all the spectrum above 1500 kHz! Their "worthless reservation" was subdivided into frequency band segments. The Communications Act of 1934 replaced the Federal Radio Commission with the Federal Communications Commission, who continued to administer amateur radio examinations and to license amateur radio operators.

The objective of radio licensing is to ensure that equipment is properly operated and not causing harmful interference to others. Up until the early 1950s, most amateur gear was home-built. Today very few transceivers are designed and constructed by the licensee who uses them.

The beginning Novice amateur radio operator class came into existence in 1951. Its operating privileges and licensing requirements have been upgraded and improved many times over the years. In 1967 Novices got many new privileges as part of the FCC's Incentive Licensing Program. The idea of incentive licensing is to trade increased radio operating privileges for increased radio knowledge and proficiency. Novices could now renew their licenses and radiate 250 watts using a VFO, instead of being crystal-controlled with 75 watts. Last year the FCC again improved Novice privileges by allowing them to use "voice" on the 10 meter amateur ham band, computer-to-computer via packet radio, and through repeaters on 220 MHz VHF. No longer are newcomers to amateur radio relegated only to the code!

Initially, Novices were tested by volunteer examiners (age 21 years old—later reduced to 18) who were provided 25-question written examinations by the FCC. The volunteer examiner began selecting the Novice questions from an FCC-determined question set in 1983 according to a formula. The system requires that a certain number of questions be randomly selected from each of nine topics concerning amateur radio rules, operation, and electronic theory. The Novice written test now contains 30 questions to encompass the new "enhanced" privileges accorded to Novices in 1987.

CB radio came about in 1958 when it became clear that small business needed a way to communicate. The old, sparsely used 11 meter amateur band was divided into 23 radio channels and reallocated to a new 27 MHz service called the Citizen's Radio Service. It was the trucker and his need to determine where gasoline and "smokies" were located that skyrocketed CB to near saturation. The public later became obsessed with CB and the Citizen's Band airwaves eventually took on the form of an overcrowded code-free amateur band using the lingo of the trucker. Even an expansion to 40 channels didn't help.

The FCC is required to determine qualifications and issue licenses to radio operators. However, due to the limited privileges available to CBers and dwindling resources, the FCC finally decided to allow CBers to operate under a general "blanket" authority approaching unlicensed operation using any call sign or "handle" of their choosing. In effect, all CBers operate under the same license!

Strictly speaking, however, Citizen's Banders aren't licensed nor do they use call signs that are required to be issued under ITU guidelines. The FCC, using creatively worded regulations, simply got around the CB licensing requirements. In practice, a government can do pretty much what it wants to by interpreting the rules to its advantage.

Another example of creative radio law exists in Japan! By international agreement code-free amateur operation isn't supposed to take place on the shortwave HF bands under 30 MHz. Japan allows it also by creatively interpreting the rules. They say that any radio operation is legally permitted under international rules provided it does not cause interference to others. No country has complained to the

National Volunteer Examiner Coordinator, P.O. Box 565101, Dallas, TX 75356

Say You Saw It In CQ

ITU about the code-free operation of the Japanese "voice-class" license. Japan has over one million "voice class" amateurs using 10 watts on the HF amateur bands *without Morse code proficiency*.

How is a Novice test now administered? The multiple-choice questions that make up the question pool are developed by VECS (Volunteer Examiner Coordinators). VECs, of which there are about 20 different organizations, now determine all questions to be asked in the various amateur radio examinations. The FCC is now completely out of the amateur examination design and administering picture. Approximately ten times as many questions as will be asked on any one examination make up each pool.

There are five different sets of questions—one each for the Novice, Technician, General, Advanced, and Amateur Extra classes. Novice applicants study the questions and their answers and then are administered 30 questions that are selected from the pool by a team of two VEs (Volunteer Examiners). VEs must hold General class licenses, have clean radio enforcement records, be age 18 years old or more, and not be related to examinees to administer the Novice 5 word-per-minute code (Element 1A) and 30-question written "theory" (Element 2) examinations. If you fail the examination, you may immediately be retested by the VE team.

The question pools are available and widely published along with the multiple choices and correct answer identified. The question-and-answer sets can be obtained from any amateur radio outlet, or by mail from W5YI Marketing, P.O. Box 565101, Dallas, TX 75356-5101. Five different classes are available: Novice, Technician, General, Advanced, and Extra class ($2.00 each or $8.95 for the entire set of five question pools complete with all the answers). There are 302 questions in the Novice pool, 288 in the Technician pool, 286 in the General pool, 507 in the Advanced pool, and 441 in the Extra class pool—a total of 1,824 questions in all.

The question-and-answer pools are also very useful to VEs in administering the various written examinations, since the formula for selecting the questions for each class is included.

How is the Novice testing program different from the Technician through Extra class VE/VEC System? Three Advanced or higher class volunteer examiners are required to administer the higher class (Technician through Extra class) VE/VEC System examinations. In addition, the VEs must be approved (or "accredited") by Volunteer Examiner Coordinators (VECs). I head up the second largest VEC organization in existence. More than 4,000 VEs are accredited worldwide under the W5YI-VEC testing program. (Send a self-addressed, stamped envelope if you are an Extra class amateur and wish to be accredited under the W5YI-VEC banner. There is no charge to become accredited. A 48-page Volunteer Examiner's manual is only $1.00, which covers only postage/handling.) Volunteer examiners in the VE/VEC System follow the testing instructions supplied by the Volunteer Examiner Coordinator. VECs in turn follow the testing guidelines issued by the FCC in Part 97 of the Commission's rules.

Every VEC organization uses exactly the same word-for-word test questions, multiple choices, and answers in all five license classes, Novice through Extra class. Thus, all license-preparation material available from any publisher will apply to your upcoming examination. It is not necessary that you purchase license-preparation material from any specific publisher or VEC. You can thus be assured that questions, multiple choices, and answers are the same no matter which VE or VEC testing program you select. You can even switch back and forth between various VE teams affiliated with different VEC organizations without fear of being tested on different material.

One word of caution, however. The VEC Question Pool Committee revises each of the various question sets once every three years to make certain that the questions properly reflect the changes in amateur radio rules, operation, and technology. You should only purchase license-preparation material that is current. Look for the cut-off date in the study material.

Novice examinations usually take place at the homes of the amateur examiners. VE/VEC system test sessions are more formal and are usually held at public places such as schools or other meeting rooms. There is never a charge to take a Novice examination. The test fees for VE/VEC System examinations, however, is currently a maximum of $4.55. This fee is adjusted every January 1st based on changes in inflation.

Form 610 applications for the Novice license are sent by the VE team directly to the FCC in Gettysburg, Pennsylvania. VE/VEC system applications, however, must be sent to the VEC for initial processing. The VEC checks the paperwork for proper handling and then forwards them to Gettysburg for license issuance. Novice level examinees can also take their examinations at regularly scheduled VE/VEC sessions at no charge. It usually takes about a month to receive a Novice license from the FCC after testing, and a little longer for Technician and higher upgrades since the application must go through the VEC System.

The Novice, General, and Extra class levels require testing in Morse code proficiency at 5, 13, and 20 words per minute. The 5 wpm code test is usually made up by the VE, while the 13 and 20 wpm code test is supplied by the VEC to the volunteer examiner. The 5 wpm code test is frequently sent by hand, while the faster speed code exams are almost always transmitted on a cassette tape.

The actual code tests may be designed by either the volunteer examiner and/or the VEC and usually consist of a transmission typically heard on the amateur airwaves. Each examination must contain all alphabet letters, numerals one to zero, and certain punctuation and operating procedure signs.

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UG21DS N plug for RG8,213,214 Silver	3.35
UG83B N jack to PL259 adapter, teflon	6.50
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Please send all reader inquiries directly.

Although this project won't qualify you for a featured role on "This Old House," it will produce a neat and functional means of transporting and using your QRP gear.

Tote 'n Talk

How To Build A Portable Operating Setup For QRPers

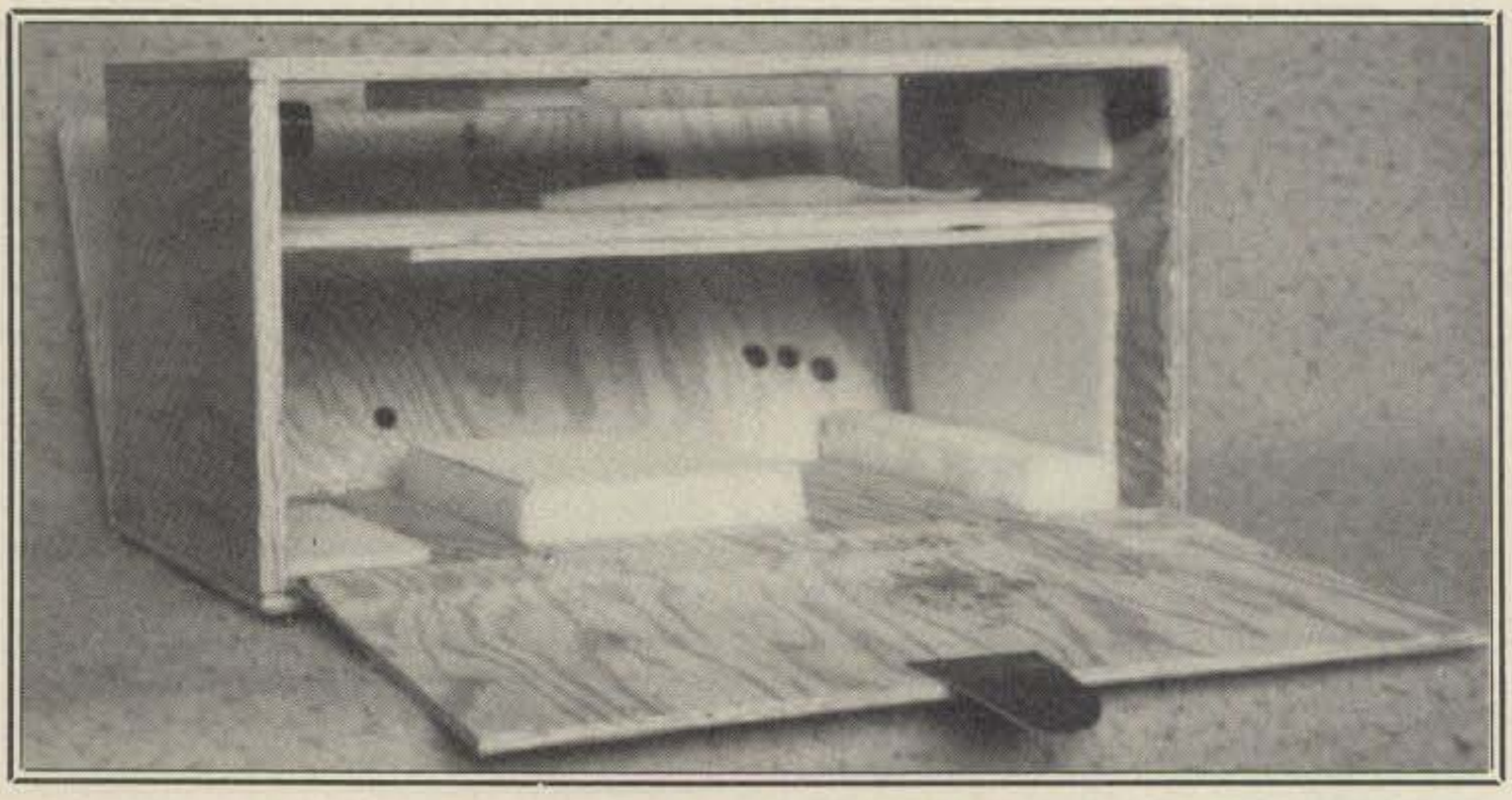
BY ADRIAN WEISS*, WØRSP

Everyone already knows that one major advantage of QRP operation is portability. However, there's a catch to this axiom, as anyone who has transported a QRP *station* knows. True, an HW-8 or Argonaut is a tidy little self-contained unit, but that's not all there is. The keyer, antenna tuner, audio filter, power supply or batteries, connectors, antenna wire and cable, etc., have to go somewhere, and they usually end up in a separate box or jammed into whatever space remains after an HW-8 is stuffed into a briefcase. All of a sudden the accessories add to the difficulty of transporting the basic transceiver. You can't "just close it up and go." You search around and find just the right size cardboard box for the accessories or for the transceiver and the accessories. Then you carry the load out to the car and then into the motel. Finally, everything has to be rediscovered and hooked up, in addition to stringing a wire. This has been a real pain, especially for me.

While writing the QRP Field Day '87 report recently I ran across one photo that showed a perfect solution to the problem—a cabinet designed specifically for the Argonaut and the station accessories. Only one box to carry! This reminded me of my days as a transient college student when I built at least two cabinets to carry my various stations. Faced with several months on the road this year, I decided that it was time to make another. This marvel of engineering ingenuity is shown in the photos.

Obviously, this exact design is useful only for stations comprised of an Argonaut 515 and audio filter, Ten-Tec power supply, MFJ-901 antenna tuner, and any keyer in an enclosure similar to that used for the MFJ-901 or the audio filter. However, adapting the design to other combinations is a quite simple matter. Many accessories used by QRPers are packaged in the widely used boxes seen in the audio filter and antenna tuner. And if your accessories show significantly different dimensions, it is a simple matter to add or subtract from the dimensions shown for my combination. The key to the success and filexibility of the approach is upholstery foam cushion padding.

*833 Duke St. #83, Vermillion, SD 57069



The finished cabinet showing front and rear panels in the open position, and a view of the accessory shelf and foam padding arrangement. The Argonaut area is at the bottom right. One-quarter inch foam is glued to the underside of the shelf and to the right side. The Argo rests on two pieces of 1 inch foam. The right piece is about 1¾ inches wide and reaches to the speaker edge on the underside of the Argo. The large center piece is 5½ inches wide and positioned at the edge of the speaker. A tongue cut from upholstery vinyl can be seen at the front edge of the front panel. This tongue squeezes against the top to hold the front in the closed position and is used to pull it open. It could be replaced with a hasp if a really solid method of keeping the front closed is needed.

The foam can be purchased at any upholstery shop and is available in a variety of thicknesses from ⅛ inch upward and is quite inexpensive. I designed my unit to incorporate foam padding for two purposes. Obviously, it is valuable as a shock absorber and protects against those bumps which are inevitable in transporting the unit. The foam exhibits a very useful compression characteristic. Although the ½ inch thickness, for example, can be compressed between the thumb and index finger to almost 1/16 inch thickness, the amount of pressure required to produce the same compression on a larger section of foam, say 30 square inches, probably is somewhere around 30 pounds. I haven't seen the specs on this stuff, but I'd guess this is "ballpark" accuracy. This means that the foam will absorb a severe shock without transmitting it to the gear.

Second, the compression characteristic solves the problem of mounting the gear firmly and without slippage. I used a foam thickness which reduced the dimensions of each piece of gear by about 1/16 to ⅛ inch on each side. Once the gear is pushed into place, the compression characteristic of the foam takes over and holds it there. You will appreciate this fact empirically when you discover the amount of downward pressure you must exert on the Argo in order to generate sufficient compression to allow it to slip into place. A final advantage of the foam is that dimensions need not be exact. By combining two thicknesses, say ⅛ and ½ inch, any extra space can be filled. I suppose it is better to end up with extra space rather than not enough.

Construction Hints for Non-Carpenters

Construction of the unit is straightforward and does not require much in the way of car-

Say You Saw It In CQ

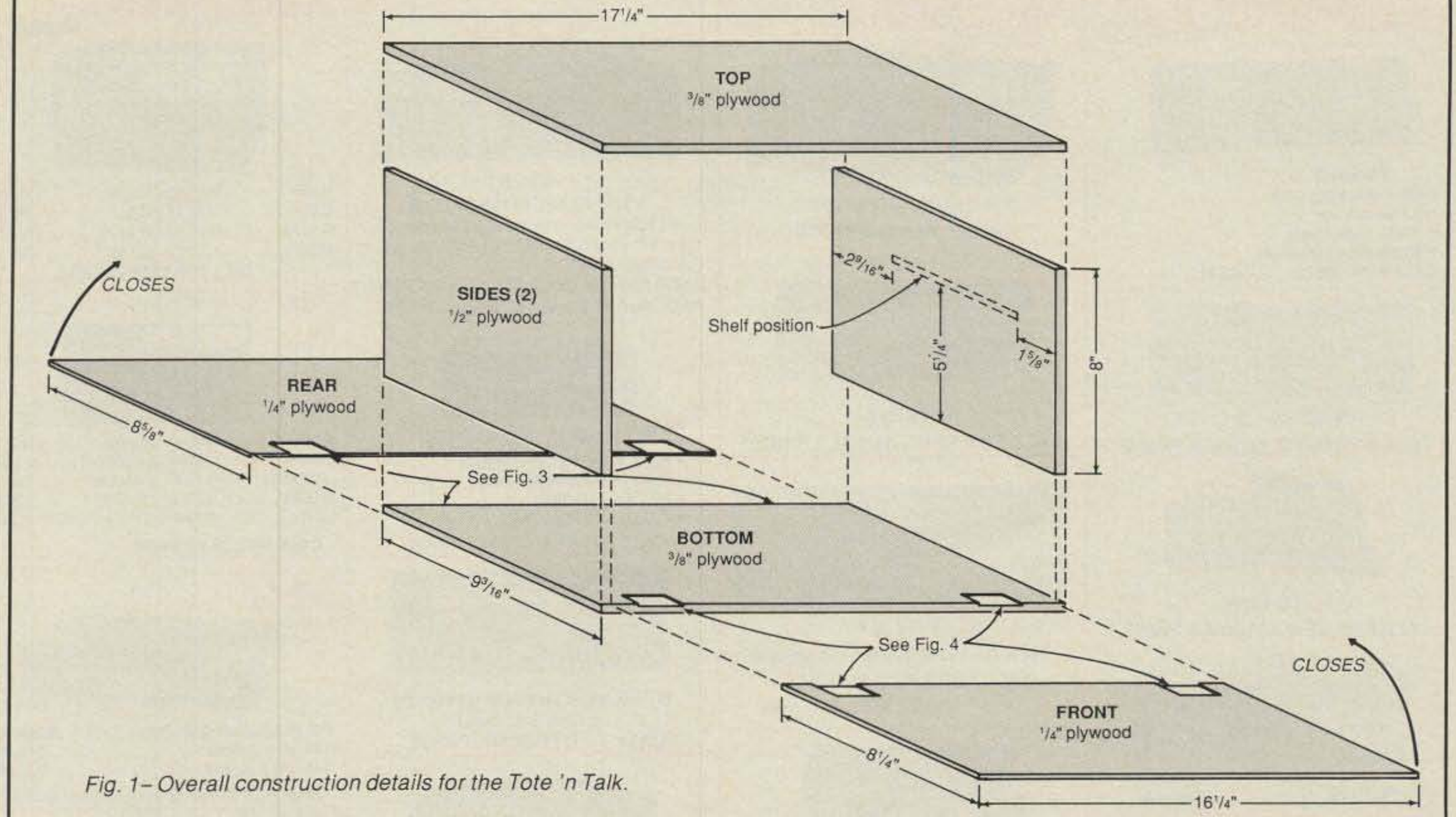


Fig. 1– Overall construction details for the Tote 'n Talk.

pentry skills. This can be appreciated by glancing at fig. 1. Several hints should enable non-carpenters (like me) to do a decent job. First, be picky about the plywood selected at the lumber yard. The lumber man, when confronted with dimensions like these, will instantly try to sell you scraps. Nothing wrong with that, except the scraps usually have been treated as such and tossed into a heap, etc. Warpage is the villain to guard against. Yes, a 16 inch piece of $\frac{3}{16}$ inch plywood can exhibit an incredible amount of warpage. So eyeball the scraps for trueness before taking them.

Second, you can achieve a much more satisfying final appearance by using "finishing" plywood, a higher grade than sheeting plywood. Although I didn't use it this time, I have built speaker enclosures from "birch veneer" finishing plywood in the past, and the end result is of furniture quality. I wish I had used it in this cabinet, since it looked like a cabinet made from plywood until I upholstered it.

Third, most lumber yards will cut to dimensions for a slight extra charge, making it possible to return home with a "kit." The objective is to end up with the *same* width dimension for top-bottom and sides, and the same length dimension for top-bottom and the sides. Inform the yard attendant of this fact and request that he cut the sections simultaneously, stacking top-bottom and sides for the width cut, and top-bottom for length, and sides for length. If your lumber yard has a bandsaw, you're in luck. Many are limited to rip-saws, which are not all that accurate, but if the above approach is followed, reasonably close dimensions will be produced. Depending on your tact, you may be able to talk the man into taking extra care or recutting if the pieces aren't the same.

Fourth, if you do the cutting with a Black & Decker hand-held jig saw (the way I did), be careful to take the cutting-width of the saw-blade into account when making cuts. I prefer using a finetooth hacksaw blade for this kind of work, since its cutting width is narrower than a wood blade and quite accurate lines are easy. One basic axiom of carpentry is: in order to produce a true straight-line cut, you have to be guided by a physically stable straight-edge aligned so as to produce the desired dimension. If you have a T-square or L-square on hand, you can anchor it to the piece of wood with a pair of vise-grips or clamps to provide a cutting guide. Otherwise, a piece of wood with a straight-edge will serve the same purpose. The distance of the cutting guide from the actual cut-line is determined by the width of the foot on the jig saw and takes into account where the edge of the wood will be *after* the cut. Let the saw do the work: apply the minimum amount of forward pressure necessary

The cabinet with the entire station in place. Note the 2 inch wide piece of 1 inch foam stuffed between the Argo and power supply. The old MFJ keyer (original 1975 model) box is cockeyed and jams in without padding. Although not visible in this front view, the AC line leaves through a hole, the audio filter cable is trimmed about 6 inches to directly reach the plug on the rear of the Argo, and a short piece of RG-58/U coax connects the antenna tuner to the Argo. I use an old, flat, rectangular Electro-Voice Model 715 ceramic mike which is wrapped in a piece of ⅛ inch foam and stored in the free space behind the Argo. A mobile log and other items are stored similarly.

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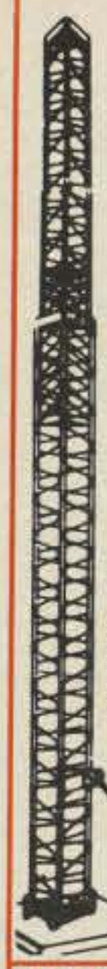

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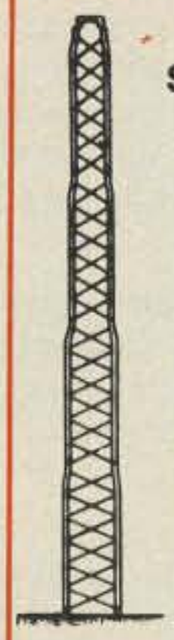

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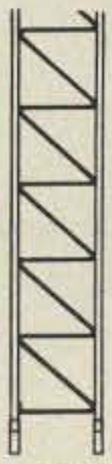

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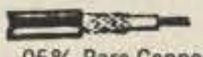

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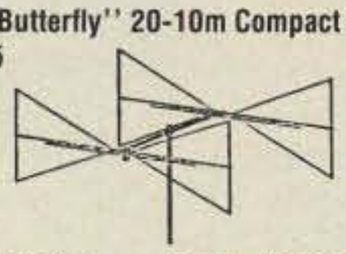

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FK4544	44 ft.	34.8 sq. ft.	1489
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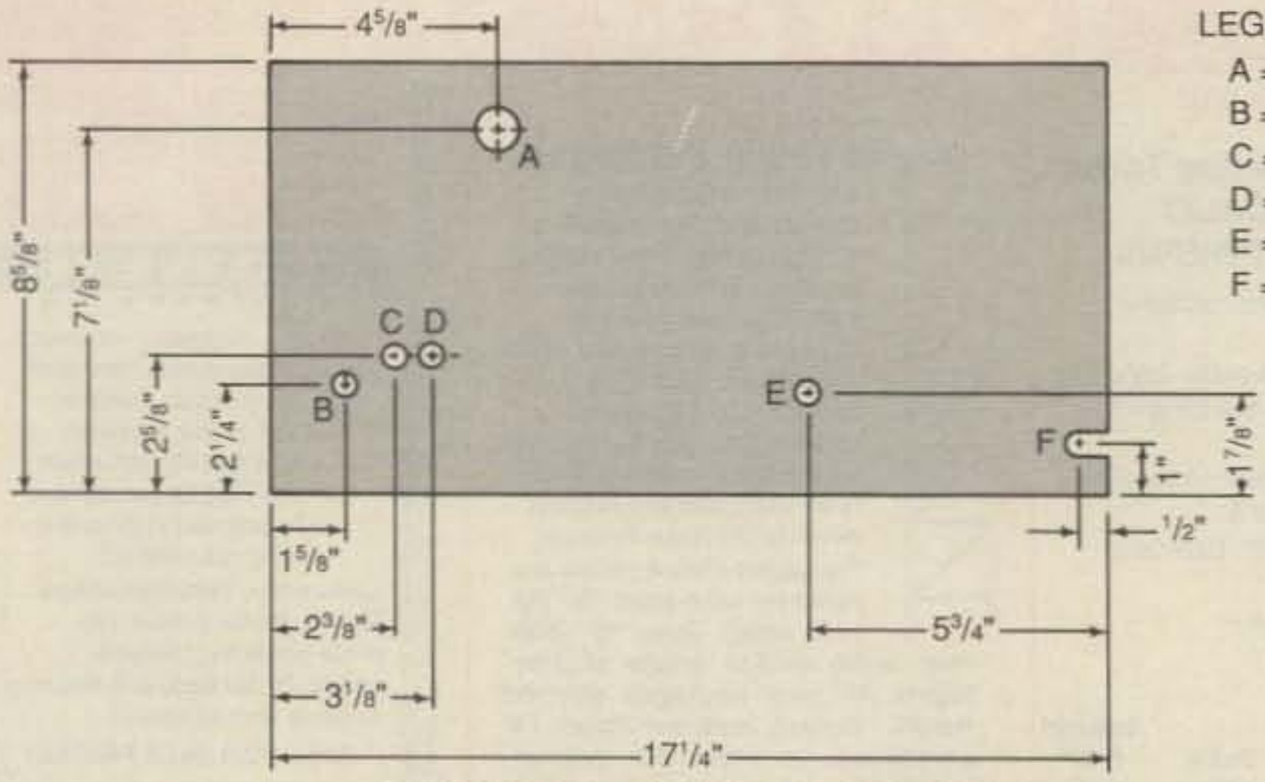


DRILLING PATTERN FOR REAR PANEL

LEGEND:

A = 3/4" dia for PL259 to coax receptacle of antenna tuner
B = 1/2" dia for antenna cable
C = 1/2" dia for phones
D = 1/2" dia for microphone
E = 1/2" dia for external 12VDC phone plug
F = 1/2" dia (cut slot for AC line)

NOTE:

Before sinking holes, line them up with your actual box for exact positioning and sizes to fit your plugs

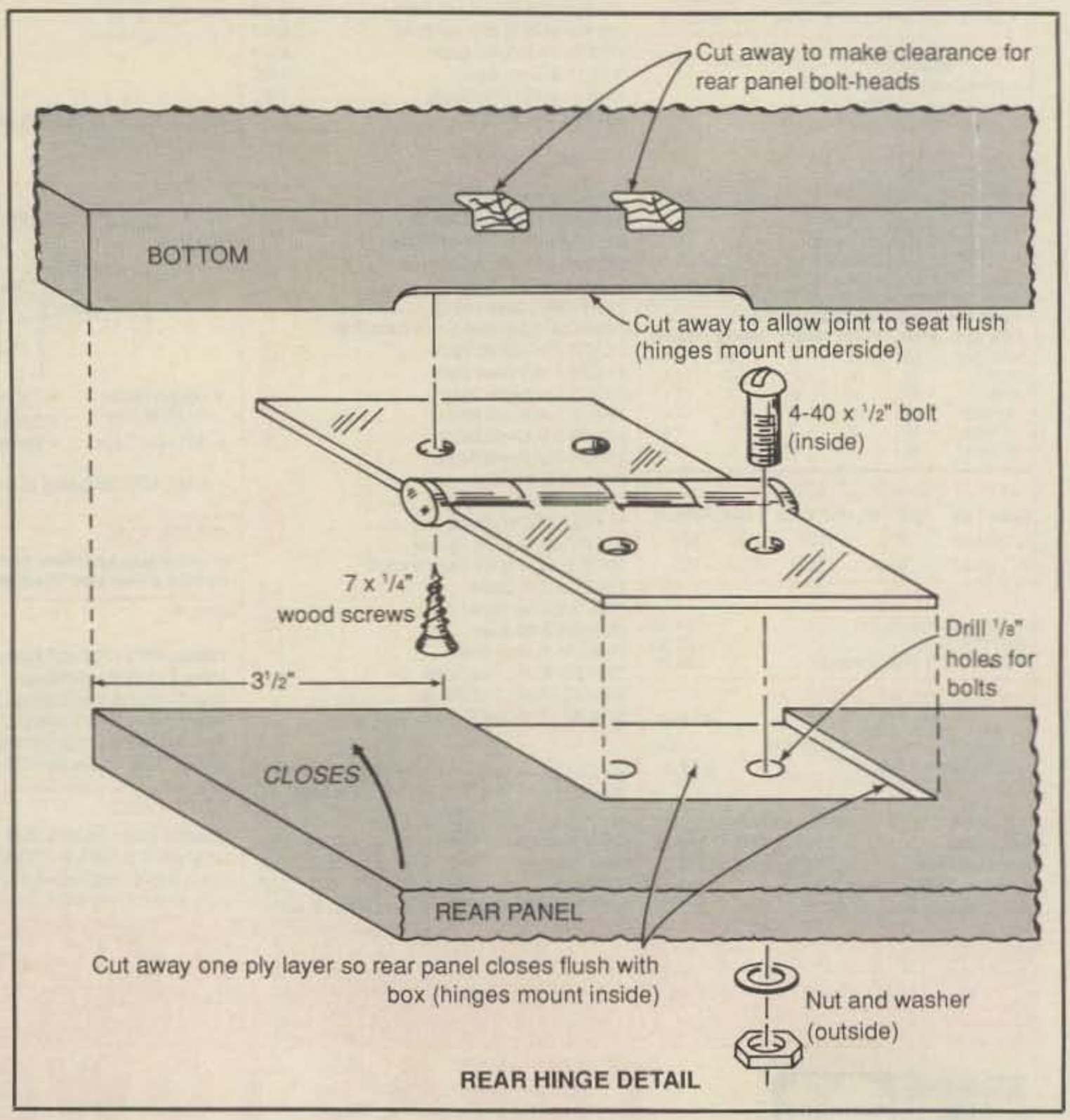
Fig. 2– Drilling details for rear panel of cabinet.

to advance the cut and maintain a constant downward pressure to hold the foot firmly against the plywood.

Once the top, bottom, and sides are cut and trued, the first assembly step follows. The reason for using ½ inch sides and ⅜ inch top-bottom thicknesses is to permit driving 1¼ inch nails (1/16 inch diameter) into the sides without splitting the wood in the process. The sides are butted to the overlapping top and bottom. The best way to end up with a square box is to drill two guide-holes per edge on each piece while the respective pieces are firmly aligned by a box that is already square—reverse engineering! Any box will serve the purpose. The procedure is simple. First install a 1/16 inch drill bit in a hand-drill or drill-press. Then line up the edges of one end of a top-bottom piece and a side by holding them against two sides of the vertically positioned box (i.e., so that your drill points away from you in a horizontal direction). Then carefully drill a guide-hole about 1 inch from each corner so that the hole is aimed along the center of the side piece. Sink the hole to about ¾ inch depth to leave some wood for the nail to bite into. It is a good idea to apply some Elmer's carpenter's glue at joints. Then carefully tap the nails into the holes while holding the joint square.

After the basic box is squared, additional nails can be driven along each edge; a total of five per edge is more than adequate. Again, hold the joint square while carefully tapping the hammer directly on the imaginary line along the center of the side piece. Front and back can then be cut to fit from ¼ inch plywood stock. The back is cut to the outside dimensions of the box. Lay the box on the uncut rear panel piece, pencil a line guided by the box perimeter, and then cut to the outline. The front panel is cut to fit snuggly into the front of the box, and the same procedure can be followed, except that the pencilled line is guided by the inside perimeter. Four rubber feet can be added at the bottom corners at this point. The installation of the hinges for front and back involves some trimming, careful alignment, and drilling.

The rear hinges are mounted on the underside of the bottom and the front face of the back panel. The objective is to make the back panel fit flush against the edges of the box in the closed position. The rear hinges are mounted on the *underside* of the bottom and the *inside* of the rear panel. It is necessary to cut away some wood at the underside edge of the bottom and the inside edge of the back to accommodate the hinge swivel joint. A sharp knife is adequate for this task, and a cut-angle of about 45 degrees does the trick. Attach the hinges to the bottom with the screws provided in the pack, or use 7" × ⅜" metal sheet screws for more grip. Since the small 1 inch hinges available at any hardware store or lumber yard are used, the orientation of the rear panel mounting screws is important for clearance. Drilling the holes is the first step. Lay the box on the rear panel so all edges are flush, mark the exact spots for the four holes, remove the box, and drill the holes for standard 6-32 × ½" screws (7/32 inch drill bit). The screw-heads are



REAR HINGE DETAIL

Fig. 3– Hinge mounting details for rear of cabinet.

Say You Saw It In CQ

on the *inside* of the rear panel, and the nuts on the *outside*. Slip a washer onto the screw before threading and tightening the nut. Finally, note that the rear panel will not close because the screwheads crimp against the top edge of the bottom. Trim away enough wood to provide clearance for the screw-heads so that the rear panel closes up.

A standard cabinet "flexigrip" spring "catch" unit mounted at the center holds the rear panel in the closed position. The objective is to hold the rear panel tightly against the box. The part with the catch spring-arms is mounted on the underside of the box top. Check your kitchen cabinets for an example of correct mounting. The screw guide-holes are located so that the tongue, which is mounted on the back panel, slips just past the catch point when inserted into the spring-arms, but not to a point where free-play occurs. Both the body and tongue parts are fastened to the top and the back with 6-32 × ¼ inch screws.

Unless you have a perfectly squared box, the rear-panel edges probably will extrude beyond the box at some points. Nonetheless, a close fit can be easily obtained by sanding with a medium-coarse grade sanding disk on a hand drill. Carefully sand away excess wood while the rear panel is in the closed position.

The front-panel hinges are aligned to permit it to fit snugly inside the box in the closed position. The hinge is mounted on the *inside* of the bottom and the *outside* of the front. To get the proper relation between surfaces, one ply layer must be cut away from the bottom, leaving a rectangular space into which the hinge fits. Then place the hinge into the space, drill holes for the 6-32 × ½ inch screws, and fasten the hinges with the screwheads on the *inside*.

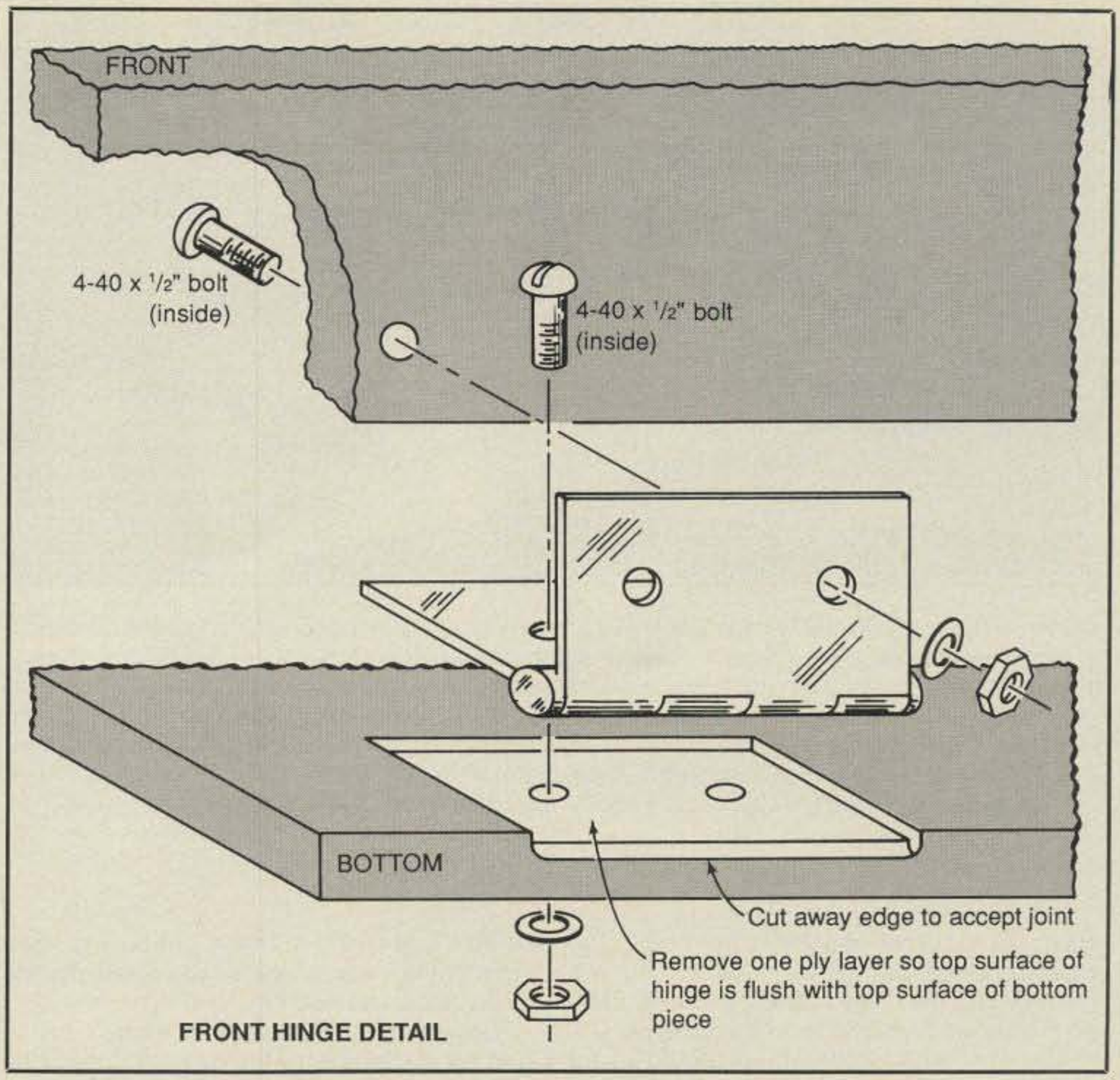


Fig. 4– Front-panel hinge mounting details.

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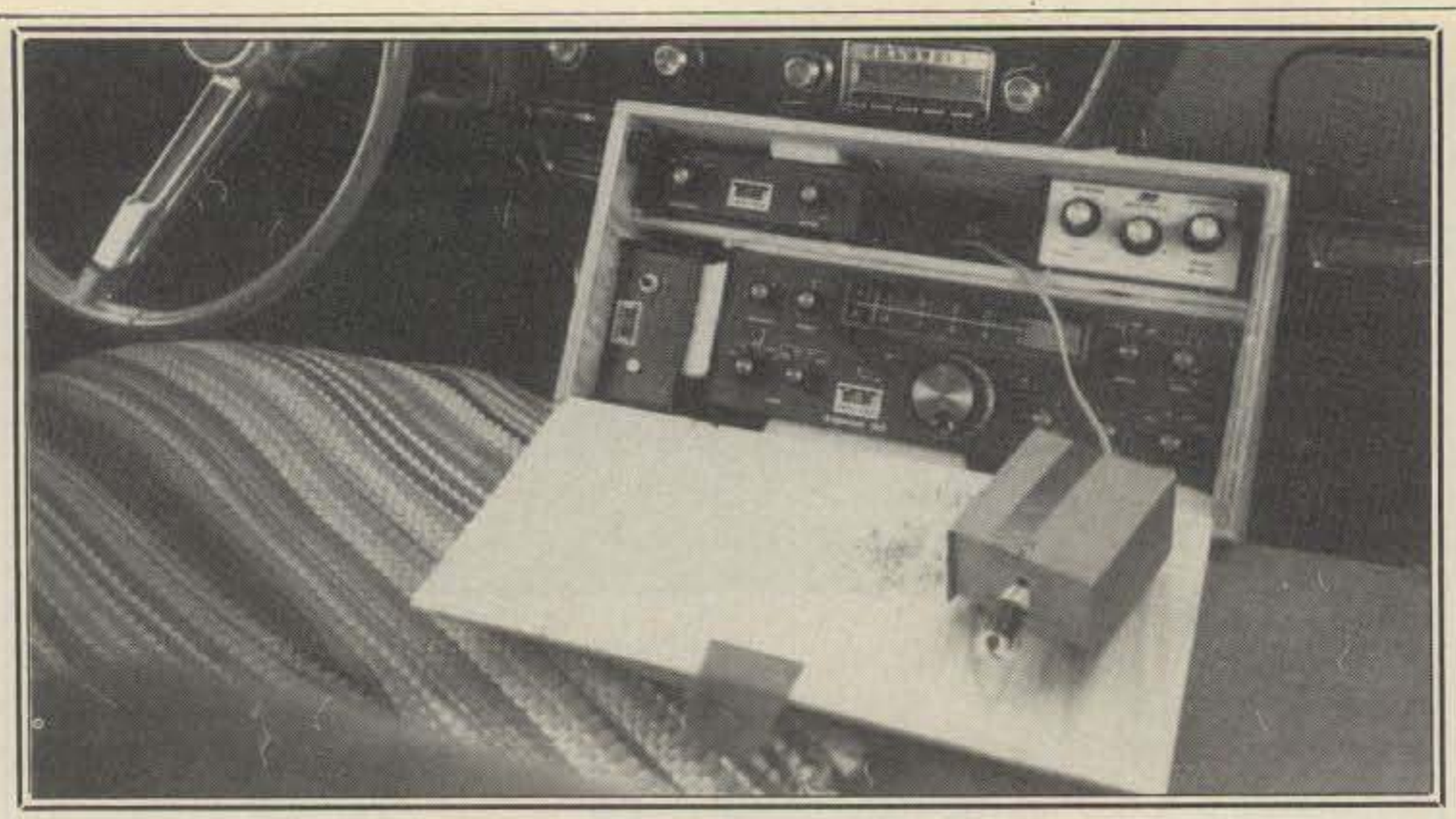

The Argo-Box in its mobile installation. It just so happened that the cabinet fits into the space between dash and seat in my old '66 Tempest—a fortunate coincidence. I put a ½ inch piece of wood between the bottom of the box and the transmission housing well and that gives exactly the right slant for operation. A piece of 1 inch foam jammed between the dash and box top firms up the installation. The Argo-Box provided an unsuspected extra advantage in as much as the front panel swings flat onto the seat, providing a very stable platform for the keyer and log. That's a luxury I've never had while mobile operation; keeping the keyer in one place was always a hassle.

Next slip the front panel into the box in the closed position, swinge the hinge onto it, mark the holes for the hinge screws, and drill. Fasten the hinges with 6-32 × ½ inch screws.

The shelf for the accessories should be cut so that about 1/16 inch of extra length remains. This permits filing (or sanding) it down for a snug fit between the sides. Once a snug fit is obtained, carefully align the shelf and drill guide-holes on each side; then tap in the nails.

The final step in my unit consisted of removing the plastic front-feet from the Argonaut and mounting them at the upper front corners to provide stops for the inward movement of the front panel. Simply position the edges of the feet about ¼ inch from the front edges of the sides, push in the original screws, and sink them. The idea of using the feet for stops hit me when I was trying to figure out how to keep from losing the feet. I guess you could call this "ricochette engineering."

Once the cabinet is together, fitting the Argo and accessories is the final step. A study of the photo will show how the foam material is positioned. For gluing the foam in place, I used 3M "Super 77" spray adhesive; other varieties can be had at hardware stores. Elmer's carpenter glue will do the job, but the spray is much quicker. Once the foam is cut to size and its location noted on the interior of the box, a liberal layer of adhesive is sprayed on it and on the area to which it will be attached. Let both surfaces "set-up" for about 5 minutes until tacky and then align the foam and press it into place.

As shown in the photos, the Argo rests on two pieces of foam. I arrived at the size of the center pad by trimming a larger piece until a reasonable compromise was reached between the difficulty of inserting the Argonaut and the firmness of anchoring. To insert, position the front of the Argo on the rear of the foam pieces, press firmly down on the top of the Argo to compress the foam, then slide in, repeating the process until about ¼ inch clearance remains between the main tuning knob and front panel. Then the power supply is inserted on its side and bottom pads, and a 3 inch piece of 1 inch foam is jammed between it and the Argo. The anchoring firmness can be tested by attempting to push the Argo and power supply toward the back of the cabinet. In my unit, the whole cabinet will move backward on its rubber feet without slippage of the Argo. The accessories are padded and inserted in the same manner. The height of the audio filter called for a 2 inch wide piece of ½ inch foam above the right knob. The height of the MFJ-901 antenna tuner determined the space between shelf and top to produce a firm fit without padding. It was inserted before the Argo, and the upward pressure of the Argo on the underside of the shelf locked it into place.

The final touch consists of drilling holes in the rear panel to permit insertion of various leads. Holes for B+ battery cable, AC power line, Argo antenna jack, phone jack, and microphone jack, and coax or wire lead to the antenna tuner are located by measuring the distance of each from the close side and bottom. Hole sizes depend upon the sizes of the various cables that will be used. While I chose not to, a regular briefcase-type handle can be mounted on the top if desired. These are available in hardware stores.

The Argo-Box will make life easier for anyone who transports a rig. I wish I'd built it years ago instead of using cardboard boxes. Lack of carpentering facilities kept me from it, but I figured anything I could toss together would be better than boxes. So I settled for the kitchen counter, table, and floor, and it turned out pretty good—not professional, but pretty good. I didn't like the sheeting plywood appearance, so I upholstered it with a leather-like vinyl upholstery material that was left over after I upholstered the dash of my '66 Tempest. High-class mobile now—leather dash and matching QRP console. The only hitch is that the car and interior are green, which may force me to paint it some other color and redo the interior. Did you ever notice how, in some cases, the tail seems to wag the dog?*

Beyond that, the home station looks a lot more attractive in the Argo-Box and I'm no longer knocking the filter and 24 hour digital clock off the top of the Argo when I reach over it to hit the power-supply switch. That in itself justifies the effort! Good luck with your package. The XYL might even let you keep the rig in the living room if you do a good job of upholstering! CQ

**The first 2000 mobile miles saw the Argo-Box resting in a nearly vertical position on the transmission well, taking all the road bumps directly without external padding. The internal padding worked as hoped and all the units remained exactly where they began. Zero slippage! I picked up a cheapie plastic "console" at the Miami Hamfest for $5.00 and that now supports the Argo-Box at exactly the right vertical angle. Going mobile is easy: plug in B+, antenna, and external speaker and hit the road!*

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Contest Calendar

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NEWS/VIEWS OF ON-THE-AIR COMPETITION

With an increase in Canadian activity in contests and stateside QSO parties, I think a review on the proper identity of the Canadian areas would be in order.

Most state QSO parties usually refer to the Canadian multiplier as just provinces or VE1–VE8 and VO1/VO2. That would limit the multiplier to a maximum of 9, when in fact there are 13 Canadian areas that should be recognized. VO1 and VO2 are not provinces but part of the Maritime region, and VE8, NWT, is also not a province, but a territory.

The actual breakdown of provinces is VE1 New Brunswick, VE1 Nova Scotia, VE1 Prince Edward Is., VE2 Quebec, VE3 Ontario, VE4 Manitoba, VE5 Saskatchewan, VE6 Alberta, VE7 British Columbia. VE8 NWT and VY1 Yukon are separate territories, and VO1 Newfoundland and VO2 Labrador are separate areas in the Maritime region.

This listing is used in our 160 Meter Contest, and to date the new Oklahoma QSO Party is the only one to properly credit the different Canadian areas.

This was covered thoroughly over a year ago when I received a clarification from a VY1 who objected to the fact that the Yukon was always listed with VE8 as part of one territory. The Yukon is a separate territory and should be recognized as such. There are also three different provinces in VE1. You are short-changing them when you indicate only VE1 as the multiplier.

I think that I am correct on the above information. I doubt it will make any changes in future announcements, but I hope it does correct some of the confusion. It would be interesting to get a clarification from the Canadian Radio Relay League and settle this question once and for all.

One correction for the November column: Logs for the TOPS Activity Contest should be sent to Bertil Arting, SM3VE, Horga 4361, S-823 00 Kilafors, Sweden (new street address).

Deadline for announcements for the March issue is December 15th, and January 15th for the April issue.

Best wishes for a Happy Holiday Season and good health for the coming year.

73 for this time, Frank, W1WY

14 Sherwood Road, Stamford, CT 06905

Calendar of Events

**	Nov.	26-27	CQ WW DX CW Contest
*	**Dec.**	**2-4**	**ARRL 160 Meter Contest**
	Dec.	3-4	TOPS 3.5 MHz CW Contest
	Dec.	3-4	Texas State QSO Party
	Dec.	3-4	Telco. Pioneers QSO Party
	Dec.	10-11	ARRL 10 Meter Contest
	Dec.	11	ARCI QRP CW Sprint
	Dec.	18	CARF Winter Contest
	Dc.31	Jn.1	ARRL Straight Key Night
	Jan.	1	AGCW Happy New Year
	Jan.	7-8	ARRL RTTY Round-up
	Jan.	7-8	Hunting Lions CW Contest
	Jan.	14-15	Hunting Lions SSB Contest
	Jan.	14-16	ARRL VHF Sweepstakes
	Jan.	21-22	Michigan QRP Club Contest
	Jan.	21-22	AGCW-DL QRP CW Contest
	Jan.	21-22	North Dakota QSO Party
	Jan.	**27-29**	**CQ WW 160 M. CW Contest**
	Jan.	28-29	YL-ISSB CW QSO Party
	Jan.	29-30	Classic Homebrew Exchange
	Feb.	4-5	Vermont QSO Party
	Feb.	11-12	QCWA CW Party
	Feb.	11-12	Dutch "PACC" Contest
	Feb.	11-13	YLRL YL/OM SSB Contest
	Feb.	18-19	ARRL DX CW Contest
	Feb.	**24-26**	**CQ WW 160 M. SSB Contest**
	Feb.	25-27	YLRL YL/OM CW Contest
	Mar.	4-5	ARRL DX SSB Contest
	Mar.	11-12	QCWA SSB Party
	Mar.	18	YLRL "East meets West"
	Mar.	18-19	YL-ISSB SSB QSO Party
	Mar.	**25-26**	**CQ WW WPX SSB Contest**

* *Covered last month.*
** *See September issue.*

1987 OK-DX Contest Results
North America

U.S. All Band		21 MHz	
K4PQL	53,997	KA2GSG	3,927
KA1DWX	15,080	K2FE	584
K2SX	7,398	W8IQ	90
W1KM	2,024	W4YN	84
WK4F	816	**28 MHz**	
WA2UDT	480	KE9A	315
7. MHz		**Canada All Band**	
K2EK	924	VO1AW	5,082
14 MHz		**Alaska 14 MHz**	
KS7P	357	NL7DU	234

ARRL 10 Meter Contest

0000Z Sat. to 2400Z Sun., Dec. 10–11

This is the 16th annual 10 Meter Contest organized by the ARRL. It's a worldwide activity in which DX stations can work other DX and are not limited to working W/Ks and VEs only.

A maximum of 36 hours operating time is permitted out of the 48-hour contest period for all stations. The same station can be worked on SSB and again on CW for QSO points.

Categories: Single operator, mixed mode, SSB only and CW only. Multi-operator, single transmitter, mixed mode only.

Exchange: W/VE stations (including KH6 and KL7) send RS(T) and state or province. DX stations (including KH2, KP4, etc.) send RS(T) and QSO number starting with 001. Maritime or aeronautical mobile, RS(T) and ITU region. Novice/Tech must identify (/N or /T).

Scoring: SSB QSOs are worth 2 points, CW 4 points, Novice/Tech CW QSOs 8 points.

Multiplier: U.S. states (50 plus District of Columbia), Canadian areas (VE1–8, VY1, VO1–2), DXCC countries, and ITU regions (1, 2, or 3).

Final Score: Total QSO points times the sum of U.S. states, Canadian areas, DX countries, and ITU regions, per mode.

Awards: Certificates to the top-scoring single operator station in each category (including /N and /T) for each ARRL section and DXCC country. And to the top-scoring multi-operator station in each ARRL division and each continent.

Indicate the multiplier only the first time it is worked. Dupe sheets are required for logs with 500 or more QSOs. The usual disqualification criteria will be enforced. A large SASE will get you log and instruction forms.

Mailing deadline for all entries is January 13th to: ARRL 10 Meter Contest, 225 Main Street, Newington, CT 06111.

ARCI QRP Homebrew CW Sprint

2000Z to 2400Z Sunday, December 11

Like the Summer Sprint, this is also a shorty, only 4 hours. The emphasis is on the use of homebrew equipment. Rules are again lengthy and complicated. I recommend you get a detailed copy from K5VOL. Following is a brief summary.

Classes: Single operator, single and all band only.

Exchange: RST and state, province, or country. ARCI members will include their membership number, non-members their

Say You Saw It In CQ

Early last summer Steve Sussman, W3BGN, a prominent contester in his own right, took a trip to Yugoslavia and had the pleasure of meeting a few of the notable contesters over there. Here is a group from the YU2BNI club station.

output power. Call must be followed with "HB" or "C" indicating type of equipment used.

Scoring: Contacts with members 5 points. With non-members 2 points. If on different continents 4 points. Add 5 points if station worked is also using homebrew equipment.

Multiplier: Sum of different states, provinces, and countries worked on each band.

Power Multiplier: 1–5 watts output ×7. Less than 1 watt ×10. Over 5 watts is a check log. Output is one-half of input power.

Power Supply Multiplier: Battery supply ×1.5, solar/natural ×2.

Homebrew Bonus: Plus 2000 if transmitter is homebrew, 3000 if receiver, and 5000 if transceiver. Used on each band.

Final Score: Total QSO points × state, province, country multiplier × power multiplier, × power supply multiplier and + homebrew bonus.

Frequencies: 1810, 3560, 3710, 7040, 7110, 14060, 21060, 21110, 28060, 28110, 50060 kHz.

Awards: Certificates to the top three all-band and single-band overall winners. And to the top scores in each state, province, and country with two or more entries.

Include a summary sheet showing the scoring, a dupe sheet for entries with 100 or more QSOs, and other essential information. Sample log forms are available and also a copy of the results. Include a large SASE for each.

Mailing deadline is January 11th to: Red Reynolds, K5VOL, 835 Surryse Road, Lake Zurich, IL 60047.

Canada Winter Contest

0000Z to 2400Z Sun., Dec. 18

Again sponsored by the Canadian Amateur Radio Federation, this activity is usually held on the last Sunday in December, but is being held a week earlier this year since Christmas falls on that Sunday.

Everyone works everyone on both sides of the border and overseas.

Classes: Single operator, all band and single band, CW, SSB, and mixed modes. Multi-operators, all band, single and multi-transmitter.

Exchange: QSO number, RS(T), name, and QTH. Province, state, or DX country.

Points: 10 points for each VE, VO, or VY contact. Four points for non-VEs, and 20 points for working any CARF official station with the TCA or VCA suffix.

Multiplier: Each Canadian area (10), territory (VE8/VY1), and maritime mobile (VEØ) worked on each band.

Final Score: Total QSO points multiplied by the sum of the multipliers worked on each band.

Awards: Certificates to the top entry in each Canadian area, US call area, and DX country in each class. Plaques to the top all-band, CW, SSB, and mixed mode.

Erratum

In the 1988 World-Wide Contest rules the U.S.A. 7 MHz CW award by Jan Perkins, N6AW, did not show it was a memorial for W6AM. This had been announced in a previous issue. The 1987 results will also be corrected.

The winner of the 1986 European Single Band CW award by the Southern New England DXA was YT3AA, Tine Brajnik, with a score of 644,171, not OH8PF as shown in the results.

In the 1986 WW CW Contest JE1CKA with a score of 24,700 should have been listed in the QRP column as a certificate winner in Japan.

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Mailing deadline is January 18th and logs go to: Jeff Parsons, VE6CB/3, RR #1, Oxford Mills, Ontario, Canada K0G 1S0.

ARRL Straight Key Night

1200Z to 1200Z, Dec. 31 to Jan. 1
(7 PM Sat. to 7 PM Sun., EST)

This is a friendly meeting on the air using a straight key only. Suggested frequencies on 80, 40, and 20 meters are 60 to 80 kHz up from lower band edges, 10 kHz from lower Novice bands.

Use SKN instead of RST in the exchange to clue in other stations. Include a list of stations worked plus your vote for the best fist heard during that period (not necessarily one you've worked).

This is not a contest, so any additional chatter is encouraged.

Send your report and vote for "best fist" and "most interesting QSO" to ARRL SKN, 225 Main Street, Newington, CT 06111 by January 10th.

Happy New Year CW Party

0900Z to 1200Z Sunday, January 1

This "get-together" on New Year's Day organized by the AGCW/EU is geared for European participation only.

However, *I see no harm if you hear someone you know to break-in and exchange New Year greetings—ed.*

Classes: 10 watts, 100 watts, and 500 watts input. Also SWLs.

Exchange: RST and QSO number. Members will add their AGCW number.

Scoring: One point per QSO on each of the three bands. Multiply by the number of AGCW member stations worked. SWLs must include both calls in their report.

Bands: 3510–3560, 7010–7040, 14010–14060 kHz.

Send your report by January 31st to: Fritz Bach Jun. DK1OU, Eichendorffstrasse 15, D-4787 Geseke, West Germany.

Hunting Lions Contest

CW: January 7–8 SSB: January 14–15
1200Z Saturday to 1200Z Sunday

Sponsored by the International Association of Lions Clubs and coordinated by the Rio de Janeiro Arpoador Lions Club of Brazil, this event is open to all radio amateurs worldwide, but the scoring is favored for working Lions Club members. Phone and CW are separate contests and require separate logs.

Classes: Single and multi-operator (clubs). Also SWL.

Exchange: RS(T), prefix QTH, and QSO number. Lions and club members will identify in the exchange.

Scoring: Contacts within the same continent, 1 point. Between different continents, 3 points.

Bonus Points: QSOs with Lions or Leo Clubs in same country, 5 points. In different countries, 10 points.

QSOs with Rio de Janeiro Arpoador or Melvin Jones Memorial Club members, 20 points.

If with the Arpoador Club station, PY1 LCA or ZY1 LCA, 25 points.

There are several restrictions in scoring for Brazilian stations which do not affect other areas.

Final Score: Sum of QSO and bonus points from each band.

Frequencies: CW—First 25 MHz from bottom of each band. SSB—3750/3870, 7070/7270, 14270, 21270, and 28550 kHz.

Awards: A wide selection of certificates and plaques for members and non-members. At least 10% of the total contacts must be with Lions, Lionesses, or Leo Clubs.

Mailing deadline for logs is February 15th to: Rio de Janeiro Arpoador Lions Club, P.O. Box 2155, Rio de Janeiro 20011, RJ, Brazil. (Requests for more informaton by stateside stations may be sent to: Robert Cywinski, 300 22nd Street, Oak Brook, IL 60570.)

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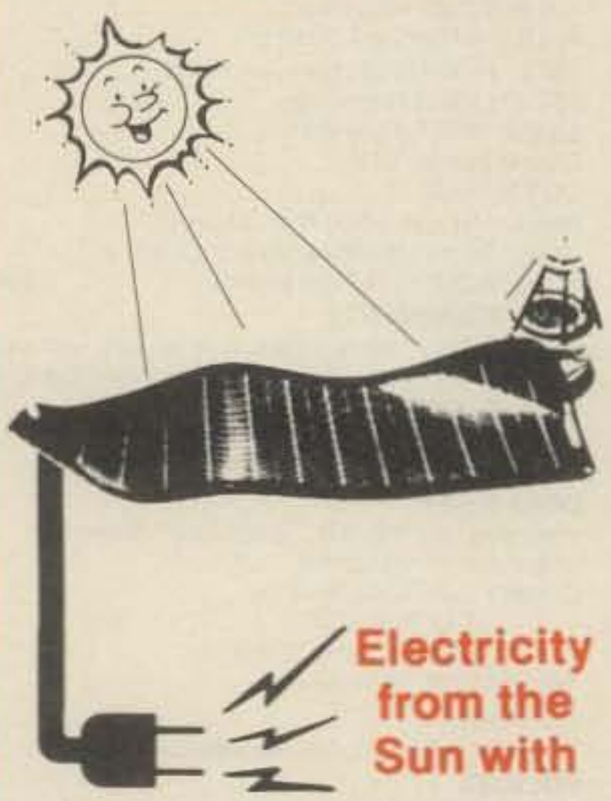

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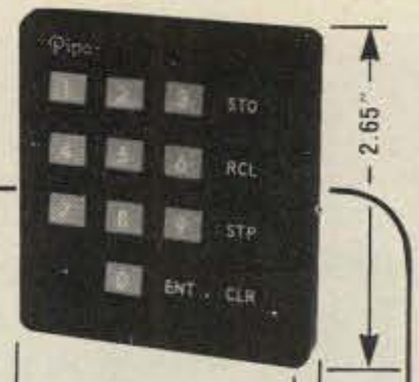

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TL-922A HF Amp	1649.95	Call $
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R-2000 150 kHz-30 MHz	749.95	Call $
RZ-1 Compact Scanning Recv.	599.95	Call $
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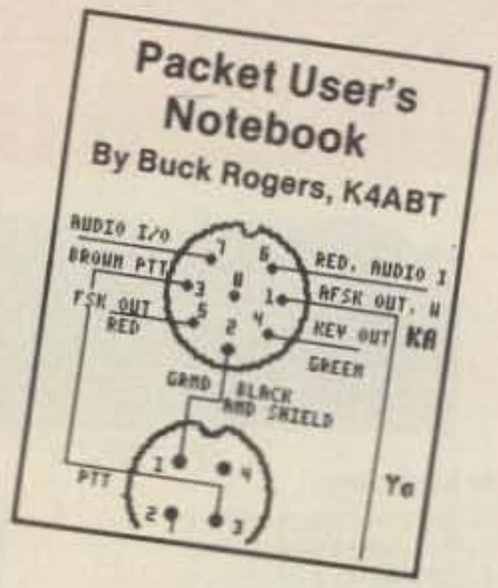

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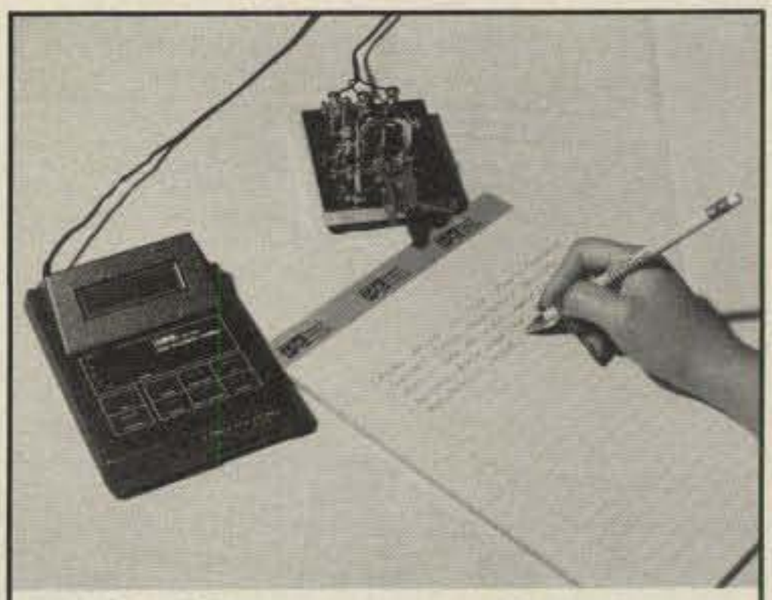

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Code generator	• Random code generator 5 characters/code group
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Keyer output	• Transistor switching, Open collector type

SPECIFICATIONS

Model	• AR-501 Radio telegraph terminal
Power source	• DC 12V to 13.8V—165mA
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Weight	• 12.5 oz. (358 g)
Controls	• Power On/Off • Random code generator On/Off • Print-out On/Off • Monitor speaker level • Electronic keyer mode select • Speed Up & Down
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CIRCLE 9 ON READER SERVICE CARD

Awards

a monthly feature by
DOROTHY JOHNSON, WB9RCY

NEWS OF CERTIFICATE AND AWARD COLLECTING

The Story of the Month for December is:

Stu Casper, W2PDM
USA-CA All Counties #546,
Mixed, 7-23-87

"I have been interested in electronics since I was 5 years old, and intended to get a ham license when I was in high school, age 15. I saved up for months, and when I had $27 I persuaded the owner of a small electronic manufacturing company to get a Hallicrafter Sky Buddy for me. The Sky Buddy sold for $29.95, but I knew that the industry discount was 10%. I guess the man felt sorry for me when I told him how long it would take for me to get another $3.00. I started listening in and learning the code and some electronic theory. My father also was studying electronics, and he and a neighboring ham said they would help me. However, World War II suddenly put a stop to amateur radio, so I put hamming on the back burner until 1946. Then I was among the first to get a post-war ticket, and have been W2PDM ever since.

"Shortly after, in 1948, I got a Master of E.E. degree from Rensselaer. I worked as a development engineer in microwave devices, and then joined with some friends to start our own microwave instrument business. This turned out well, allowing me to retire early, giving me more time to get counties. I am also an active layman in the Anglican Catholic Church, and go mobile to synods and committee meetings that are held in various parts of the country. You may believe I put out lots of counties on these trips.

"Late in 1972 I returned to amateur radio after several years of inactivity, but between long hours at work and raising a very lively family, I only had a few minutes a day for operating. I found that if I got into a lengthy ragchew, I soon would be interrupted. And as for DX, there just was not time to chase it. So I found myself checking into various types of nets just to say a few words and get a signal report. On November 13, 1972 I found one of the predecessors to the MECH Net, with the alphabet soup name CHC/FHC (Certificate Hunters Club/Flying Hams Club). I worked K1LBK at that time and soon was checking in again and again and picking up counties. Even though I didn't know anything about awards, I had some fun!

333 South Lincoln Ave., Mundelein, IL 60060

Stu, W2PDM, "at home" in his well-appointed shack in North Carolina.

"The following July I went portable by taking the rig on my Maine vacation. I didn't even know what county I was in, but someone on the net wanted to know. I knew the town I was in, and someone said that was in Cumberland County, which I later verified. Awaiting me in my mail at home was a MRC, an SASE from WA9SXQ (now WA9PQY), and a note thanking me for a 'new one.'

"When I realized that people get such a thrill out of working a new county, I decided to go mobile and make a lot of people happy. Well, it took a while to get going, and on April 9, 1975 my wife Dee and I, with our youngest son, Ricky, who kept the log on that trip, went from Suffolk County, New York to Orleans Parish, Louisiana and had a terrific time putting out counties there and back.

"It was not until I retired in 1983 that I really had time to work to complete them all. Finally, on June 8, 1987, my good friend Orv Johnson, VE3BFJ, with his wife, Sybil, pulled up on the county line of Dodge and Telfair, Georgia—my last two for them all. They had taken a long detour on their annual summer trek from Florida to Canada. It was touch and go, as I could not hear Orv on 20 meters, so we went to 40 and easily exchanged our reports.

"I want to thank all the many mobile and fixed operators who gave me counties, and especially the net controls, without whom the net would be a shambles. I also want to thank Dee for her loving support, never begrudging the time, and encouraging me to continue. Dee also keeps the log when we go mobile, which we have been doing for 15 years—66 trips, by car, by motorhome, and by airplane to a rent-a-car, putting out over 1500 counties in the process. Best of all has been meeting county hunters at the national and regional conventions. I know of no finer group of people anywhere.

"We have visited some of these good folks from Maine to California, and some have been to our house, too. We count many of them among our best friends and cherish our acquaintance with them.

"My home station at this time includes an ICOM 751 transceiver, an Alpha 78 amplifier, and a KLM 7-element log periodic beam. While mobile I use an ICOM 730 and a 3-way Hustler for 20, 40, and 75 meters. Sometimes I put up a second antenna for 10 or 15 meters. I also have 2 meter gear, base and mobile, and operate some packet on 2 meters. I get a real kick out of combining my C-64 computer with ham operation. The computer also keeps track of county contacts.

"See y'all at the next convention. If anyone needs Alexander County, North Carolina, fixed or mobile, phone or CW, any band, give me a call—73, Stu, W2PDM."

USA-CA Special Honor Roll

Eugene W. Nadolny, W2FXA
All Counties #578, Mixed, 8-16-88

T.A. "Abe" Daniels, W7GQK
All Counties #579, All SSB, 8-20-88

Awards Issued

Eugene Nadolny, W2FXA, collected his last confirmation and claimed USA-

USA-CA Honor Roll

3000		**1500**	
W2FXA	612	KA0NVT	841
W7GQK	613	W2FXA	842
		W7GQK	843
2500			
W2FXA	686	**1000**	
W7GQK	687	HB9BYZ	1026
		W2FXA	1027
2000		W7GQK	1028
W2FXA	754		
W7GQK	755	**500**	
		WD8CTX	2266
		W7GQK	2267

The total number of counties for credit for the United States of America County Award is 3076. The basic award fee for subscribers to CQ is $4.00. For non-subscribers, it is $10.00. Initial application must be submitted in the USA-CA record book which may be obtained from CQ Publishing Company, 76 North Broadway, Hicksville, NY 11801, U.S.A. for $1.25. To qualify for the special subscriber rate please send a recent CQ mailing label with your application. To be eligible for the USA-CA, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated April 2, 1985. A complete copy of the rules may be obtained by sending a SASE to the USA-CA Custodian, 333 South Lincoln Avenue, Mundelein, IL 60060, U.S.A. DX stations must include extra postage for air mail reply.

Say You Saw It In CQ

CA All Counties #578, USA-CA 3000 #612, USA-CA 2500 #686, USA-CA 2000 #754, USA-CA 1500 #842, and USA-CA 1000 #1027, Mixed, dated 8-16-88.

T.A. "Abe" Daniels, W7GQK, claimed his certificate with a full complement of endorsements for USA-CA All Counties #579, USA-CA 3000 #613, USA-CA 2500 #687, USA-CA 2000 #755, USA-CA 1500 #843, USA-CA 1000 #1028, and USA-CA 500 #2267, All SSB, dated 8-20-88.

Clyde E. Kane, KA0NVT, added a gold seal to his certificate by claiming USA-CA 1500 #841, Mixed, dated 8-1-88.

Peter Zbinden, HB9BYZ, filed his good application for USA-CA 1000 #1026, Mixed, dated 8-16-88.

USA-CA 500 certificates went to:

Rodney D. Crawford, WD8CTX, USA-CA 500 #2266, All 6-Meter SSB, dated 8-11-88.

T.A. "Abe" Daniels, W7GQK, USA-CA 500 #2267, All SSB, dated 8-20-88.

Awards Available

ORARI Awards Program. ORARI (Organisasi Amatir Radio Indonesia) has announced a new awards program. Offered are:

The *Jakarta Award* (JA/SWL-JA) for confirmed contacts with, or having heard from, licensed amateurs in Jakarta (0 call area only), the capital of the Republic of Indonesia.

Worked All Indonesia Award (WAIA/SWL-WAIA) for confirmed contacts with, or having heard from, licensed amateurs in each of the Indonesia call areas.

Worked The Equator Award (WTEA/SWL-WTEA), for confirmed contacts with, or having heard from, licensed amateurs in countries along the Equator.

The *Danau Toba Award* (DT/SWL-DT) for confirmed contacts with, or having heard from, licensed amateurs in the Province of North Sumatra, Indonesia (call area 6).

The *Borobudur Award* (BA/SWL-BA) for confirmed contact with, or having heard from, licensed amateurs in the central part of Java, Indonesia (call area 2, which includes the provinces of Central Java and Yogyakarta).

General Rules. ORARI Awards will be issued to licensed amateurs for 2× SSB, 2× CW, 2× RTTY, Mixed or Single Mode, Mixed or Single Band on the 80, 40, 20, 15, 10 meter bands only. SWL awards in the same categories will also be available. The applicant may request endorsement accordingly.

To be valid all contacts or listening must be on or after July 9, 1968. Applications must be accompanied by a QSL card list (GCR) furnishing the call signs of stations worked, dates, bands, and modes of contacts meeting the requirements of the award concerned. Other rules and requirements are specified, when required, for each of the individual awards.

The QSL card list must be accompanied by a statement from the applicant's national society, club station, or any two amateurs other than the applicant, that QSL cards for the contacts listed are in the possession of the applicant and that the items of the cards are correctly listed.

A fee of $8.00 US or 16 IRCs will be charged per award and should be sent along with the application to the respective awards managers.

Only contacts with land stations within the same country will be acceptable.

The Jakarta Award for working stations in Jakarta, Capital of Indonesia.

Jakarta Award. The Jakarta Award (JA/SWL-JA) is available to licensed amateurs the world over. It is issued for confirmed contact with, or having heard from, stations in Jakarta (0 call area only), the capital of the Republic of Indonesia, and meeting the following requirements:

1. DX stations need confirmed contacts with, or must have heard from, a total of 20 stations including at least one Jakarta Club station.

2. Indonesian amateurs need confirmed contacts with, or must have heard from, a total of 50 stations including at least 5 Jakarta Club stations.

3. To apply, send the log extract (GCR), in alphabetical order by prefix, along with the award fee, to the Award Manager, Mr. M.S. Lumban Gaol, YB0WR, P.O. Box 96, Jakarta, 10002, Indonesia.

4. QSL cards are required from the Indonesian licensed amateurs operating within the 0 call area. A self-addressed stamped envelope (SASE) or sufficient funds for return postage is also required.

5. Club stations in the 0 call area are YB0ZAA, YB0ZAB, YB0ZAD, YB0ZAE, YB0ZAF, YB0ZBA, YB0ABB, YB0ZCA, YB0ZCB, YB0ZCD, YB0ZCE, YB0ZDB, YB0ZDC, YB0ZDD, YB0ZDE, YB0ZDG, YB0ZEA, YB0ZEE, ZB0ZZ.

Worked All Indonesia Award offered by the Amateur Radio Organization of Indonesia.

Worked All Indonesia Award. The Worked All Indonesia Award (WAIA/SWL-WAIA) is available to licensed amateurs the world over. It is issued for confirmed contact with, or having heard from, stations in each of the Indonesian call areas (1 through 0) and meeting the following requirements:

1. DX stations other than those in CQ Zone 28 need confirmed contacts with, or must have heard from, 2 stations in each call area; a total of 20 QSL cards.

2. DX stations in CQ Zone 28 need confirmed contacts with, or must have heard from, 3 stations in each call area; a total of 30 QSL cards.

3. Indonesian amateurs need confirmed contacts with, or must have heard from, 5 stations in each call area; a total of 50 QSL cards. Contact with, or having heard from, three different station classes (YB, YC, YD) in the same call area is a must.

4. To apply, send the log extract (GCR), in alphabetical order by prefix, along with the award fee, to the Award Manager, Mr. M. Maruto, YB0TK, P.O. Box 96, Jakarta 10002, Indonesia.

Worked The Equator Award. The Worked The Equator Award (WTEA/SWL-WTEA) is available to licensed amateurs the world over. It is issued for confirmed contacts with, or having heard from, ARRL DXCC countries along the equator as follows: C2, HC, HC8, HK, KH1 and KB6, PR–PY, PY0 (St. Peter), S9 (Sao Tome), T30, T31, T32, TN, TR, YB5, YB7, YB8, 5X, 5Z, 6O, 8Q, 9Q.

The WTEA (SWL-WTEA) is issued in three classes:

Class I—For confirmed contact with, or having heard from, 15 countries.

Mr. M.S. Lumban Gaol, Manager, Jakarta Awards, Indonesia.

Worked the Equator Award for contacts with DXCC countries along the equator.

Class II—For confirmed contact with, or having heard from, 12 countries.

Class III—For confirmed contact with, or having heard from, 8 countries.

For all classes, contact with or having heard from YB5, YB7, and YB8 is obligatory.

To apply, send log extract (GCR), in alphabetical order by prefix, along with the award fee, to the Award Manager, Mr. Ben S. Samsu, YB0EBS, P.O. Box 96, Jakarta 10002, Indonesia.

Danau Toba Award. The Danau Toba Award (DT/SWL-DT) is issued for confirmed contacts with, or having heard from, stations in the Province of North Sumatra, Indonesia (call area 6), and meeting the following requirments:

1. DX stations need confirmed contacts with, or must have heard from, a total of 10 stations including at least one (1) North Sumatra Club Station.

2. Indonesian stations need confirmed contact with, or must have heard from, a total of 20 stations, including at least three (3) North Sumatra Club stations.

3. To apply, send log extract (GCR), in alphabetical order by prefix, along with the award fee, to the Award Manager, Mr. H. Jans Fauzy, YB6MF, P.O. Box 232, Medan, North Sumatra, Indonesia.

4. Club stations in the 6th call area are: YB6ZAA, YB6ZAB, YB6ZAC, YB6ZAD, YB6ZAE, YB6ZAF, YB6ZAG, YB6ZAH, YB6ZAI, YB6ZAJ, YB6ZES, YB6ZZ.

Borobudur Award. The Borobudur Award (BA/SWL-BA) is issued for confirmed contacts with, or having heard from, stations in the Central Part of Java (call area 2, which includes the Provinces of Central Java and Yogyakarta) and meeting the following requirements:

1. DX stations need confirmed contact with, or must have heard from, a total of 25 stations.

2. Indonesian stations need confirmed contacts with, or must have heard from, 50 stations. All license classes (YB, YC, YD) should be obtained, regardless of number of each class, in reaching the total of 50.

3. To apply, send the log extract (GCR), in alphabetical order by prefix, along with the award fee, to the Award Manager, Mr. Timmy Dhanuwijaya, YB2BGZ, P.O. Box 88, Semarang, Indonesia.

Award Notes. When applying for an award, courtesy demands that the following be observed.

• Print your name, call sign, and address.

Borobudur Award for contacts with Indonesian Provinces of Central Java and Yogyakarta.

• Clearly state the award and endorsements for which you are applying.

• Send the application to the respective award manager for the award claimed, and enclose the award fee (in money order or IRCs) as specified. A personal check is not acceptable.

• For Indonesian amateurs, application must be made with the model-K form issued by the national QSL and Awards Bureau and must be verified by the assigned regional checkers.

• ORARI stresses the honor of fair play and sportsmanship of the applicants working toward these awards. Use of poor ethics will result in permanent disqualification.

• All correspondence should be sent to ORARI National QSL and Awards Bureau, P.O. Box 96, Jakarta 10002, Indonesia.

• Indonesian licensed amateurs may send the cards directly or have them verified by the ORARI awards checkpoint nearest to their location. Current checkpoints or checkers include YB1DRE, YB2SV, YB2BLI, YB3CDL, YB3DC, YB4FNN, YB5NOF, YB6MF, YC6TT, YB7BC, YB7UE, YB8QD, YB9VA, YB0JH.

PJ1B WW DX Certificate

Late word has been received from Ed Moody, N3ED, that again this year a certificate will be awarded to any single operator who works station PJ1B on five bands during the CQ World-Wide DX Contest. There is a special endorsement for five bands and 160. The certificate must be earned during the contest weekend; contacts before and after *do not* count toward receiving the certificate. There are, however, separate certificates for each mode, and the certificates are different for the CW weekend than the phone weekend.

Ed also reported that certificates have been sent to every single operator who appeared in their logs on five bands during the 1987 CQ WW SSB Mode, and a special sticker endorsement was added for those who worked them on all six bands. More than 80 amateurs worldwide received certificates.

Any operator who feels that he should have received a certificate and did not is welcome to send a request to N3ED with an SASE. The request should contain the times of the QSOs by band. They will review logs and let the applicant know whether or not a certificate is coming. Delivery of the certificate will take four to six weeks.

Notes

Once more the holiday season has arrived. May your holidays be joyous and for the New Year we wish you health, happiness, and ambitions fulfilled.

73, Dorothy, WB9RCY

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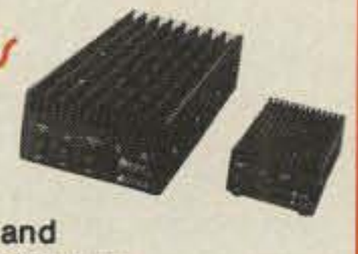

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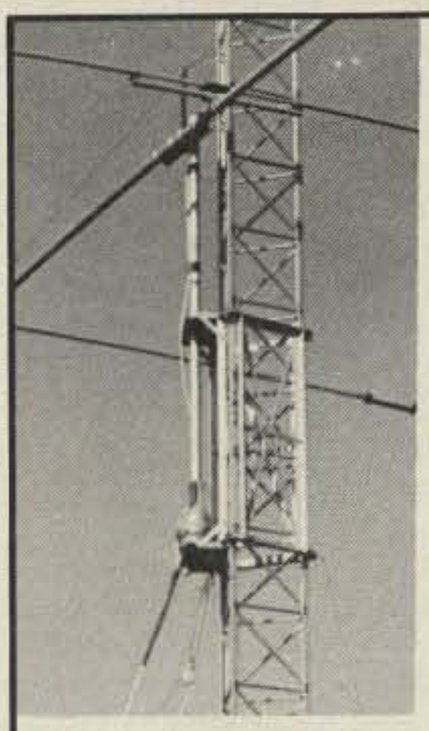

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CIRCLE 85 ON READER SERVICE CARD

Antennas & Accessories

a monthly feature by
KARL T. THURBER, JR., W8FX

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

The Quad Revisited

As we mentioned in our 1981 review of the Gem Quad, not everyone can erect a large Yagi array to give one's signal a needed boost when working rare DX, competing for contest points, or trying to keep a dying band open a little longer. Element length, spacing, and boom length are usually formidable on the Yagi, not to mention weight and cost. The light weight, simplicity, low cost, and good performance record of the quad have made it an appealing antenna for many amateurs.

The competition between Yagi and quad enthusiasts is one that will probably never be settled amicably. Element-for-element, and dollar for dollar, the quad offers more gain and generally better overall performance, but the bulkiness and wind area of the latter can make it a tricky and cumbersome antenna.

Both antennas can offer considerable gain over the simple dipole, with good front-to-back (F/B) ratios—if they are properly designed! Of the two types, the Yagi is the more popular antenna (especially in the three-element monoband version), while the quad is slightly better than the Yagi for DX, on an element-for-element basis. On the one hand, the Yagi is mechanically stronger than most quads, though it's difficult to homebrew a trap Yagi due to the mechanical complexities introduced by the traps. Too, the quad is relatively easily built for either single- or multi-band operation, but it's an unwieldy antenna to handle on the ground and to get up into the air.

Here are some observations I've gleaned regarding comparisons between the two antennas—trying not to take sides, instead just presenting "the facts" as I see them:

•The quad is a relatively inexpensive antenna if made of bamboo, though it can become more expensive than the Yagi if specially fabricated spreaders, aluminum spiders, and other custom fixtures are used in construction.

•The quad is about equivalent in power gain to a Yagi having one additional element. The quad also exhibits somewhat more gain than does the Yagi for a given boom length, size, and turning radius.

•The quad is less popular than is the Yagi, largely because it requires additional effort to install and maintain. A rather "boxy" antenna, the quad is bulky and fragile to handle and to hoist into position when compared with the Yagi.

•The quad is more broadbanded than is the Yagi, being a low-Q closed loop. This makes the quad less critical of exact tuning. End effects, prevalent with the Yagi's dipole-like elements, are reduced in the quad.

•The Yagi is less susceptible to damage from strong winds and ice storms. Its on-the-tower appearance is more aesthetically pleasing than is the quad, at least in the public's mind.

Shown here is the top-of-the line Nye Viking MB-V-A 3 KW matching network, which may be considered to be a 1980s descendant of the venerable old Viking Kilowatt Match Box of 1950s and 1960s fame. (Photo courtesy Wm. M. Nye Co.)

•The quad is somewhat less vulnerable to lightning strikes and static discharges than is the Yagi, as it has no sharp end points.

•The quad is easier to adjust for proper performance than is the Yagi since there is less interaction between the elements, the element spacing is less critical, and there are no traps to tune. However, feeding schemes can become quite complex, especially in multiband quads.

At the bottom line, there's little really noticeable on-the-air difference between, say, the three-element Yagi and the two-element cubical quad. The choice boils down to a personal one, one that should be based at least partially on practical assembly, construction, installation, and tuneup considerations rather than on the narrow differences in expected performance.

What has our own experience with the quad been? Quite good, and we reviewed one of the more popular quad kits in the July 1981 issue—the two-element Gem Quad. While we won't go over all of the details of our review, we'll hit some of the high points to help put the quad into perspective.

The Gem Quad, in production since 1967, is a two-element, full-wave loop beam designed for triband operation on 10, 15, and 20 meters, though additional bands as high as two meters can be accommodated, and three- and four-element versions are also available. (A typical two-element quad has a forward gain of 7 dBd, rising to 10 dBd for a three-element version and 12 dBd for a four-element quad. See Table I for comparative gain figures.)

The antenna's "arms" are made up of triple fiberglass spacers, fabricated into a so-called "tridetic" design, as it's called by the Gem Quad folks. Each arm is ribbed and fiberglass-cord bundled into a configuration that faintly resembles a miniature tapering triangular tower. This unusual design gives excellent strength but less wind resistance than if the spacers were made of solid fiberglass stock.

The mounting spider, at the heart of the antenna, is fabricated from a heavy-duty aluminum alloy which has a 1-1/2 inch O.D. stub protruding downward from the center for mast mounting. The spider is hollow and allows for the insertion of different-size booms, should one wish to add a third or fourth element.

Up to this point, the antenna is of fairly conventional design. What is different about this quad is that it is boomless: a single spider on the two-element model supports all of the fiberglass spacers from a common focal point. The three-dimensional design of each set of loops enables reflector-to-driven element spacing that approaches theoretical optimum values. A simple toroidal balun allows single-feedline match on all three bands; the three driven element wires are paralleled and connected directly to the balun.

In corresponding with D. Daryl McKinney, Gem Quad's proprietor, he advised us that he purchased the firm from longtime owner Haydn Brisley in March, 1987, forming the new firm of Gem Quad Products (1987) Ltd. Since taking over the firm, Daryl has not made any changes to the antenna. He notes that while the Gem Quad is sold primarily as a triband antenna with a proven design, customization to cover other bands is possible through experimentation on the user's part. But he mentions that it may not be possible to configure the antenna to use additional bands at one time. Current prices run from $235 for the two-element version to $563 (U.S.) for the four-element version; extra elements are $164 each.

For specs, contact Gem Quad Products (1987) Ltd., PO Box 291, Boissevain, Manitoba, Canada R0K 0E0. (Trivia note: Bossevain is home to the Canadian Turtle Derby—bet you didn't know that!)

Note: For more information on the quad antenna design, beg, borrow or steal our three part series, "A Primer: The Cubical Quad Antenna," which appeared in *CQ* spread out over the August 1981, December 1981, and April 1982 issues. Reprints of these articles are available from *CQ*'s Hicksville, NY offices for $2.50 each.

Remember Waseca?

I've never been to Waseca, Minnesota, and don't know anything at all about the town—except for one thing: it was the long-time home of the E. F. Johnson Company, one of amateur radio's proudest equipment manufacturers in the 1950s and 1960s.

If you'll flip open an old copy of *CQ* or *QST* from that period, you'll likely find a multipage ad from Johnson extolling the virtues of their equipment, whether it be a transmitter such as the venerable Viking II (my second amateur rig, mind you!), the upscale Viking Valiant and

317 Poplar Drive, Millbrook, AL 36054

Say You Saw It In CQ

Comparative Gain Table

Antenna type	dB gain over half-wave dipole	dB gain over isotropic source
Isotropic radiator	+ 2.1	N/A
Quarter-wave ground plane	− 1.8	+ 0.3
Half-wave dipole	N/A	+ 2.1
Quad loop	+ 2.0	+ 4.1
2-el Yagi	+ 5.0	+ 7.1
Expanded quad loop	+ 5.0	+ 7.1
2-el quad	+ 7.0	+ 9.1
3-el Yagi	+ 8.0	+10.1
2-el expanded quad	+ 9.5	+11.6
4-el Yagi	+10.0	+12.1
3-el quad	+10.0	+12.1
7-el Yagi	+11.0	+13.1
3-el expanded quad	+12.0	+14.1
4-el quad	+12.0	+14.1
5-el quad	+13.0	+15.1

Table I– Relative power gain of several popular antennas relative to isotropic and dipole sources. The gain figures are representative, so expect to see slightly different figures quoted by different manufacturers and in various antenna texts. Element configurations and spacings also play a role. Be sure you know against which standard of reference the antenna is being compared!

Viking Kilowatt transmitters, the Viking mobile, or dozens of other products.

Many of these rigs are still around and healthy today, as are what are likely Johnson's best known products, the Johnson Viking Match Box and Viking Kilowatt Match Box antenna tuners. For many amateurs who got their start in the 50s and 60s, the Match Boxes put "antenna tuner" into their vocabulary.

Unfortunately, E. F. Johnson is no longer an amateur supplier today. However, the Viking name was taken over in the 1970s by the William M. Nye Company. Under the Nye Viking name, many Johnson accessories have been reincarnated, so to speak, and carried on. These include a line of 3000-watt antenna tuners (follow-ons to the Kilowatt Match Box), low-pass filters, SWR bridges, phone patches, keys and keyers, and the like.

I corresponded with Bill Nye, W7DZ, to find out how he came to carry on the Viking name. Bill wrote back:

"It all began at a board meeting of a company called Mathematical Sciences N. W. back in the spring of 1973. I was retired since 1970 but still active on a few boards; this was a dinner meeting and the members were still chatting. Mr. Horner, then president of E. F. Johnson, mentioned that their company was celebrating their 50th anniversary. I told him I used to buy things from them 50 years ago. He said that they were closing out the amateur product line and I asked him what they intended to do with it. He remarked that they would like to find a buyer that would do something with it."

"I was interested [in purchasing the firm] but my wife wasn't. However, I did tell a friend, a professor at the University of Washington and he talked [us] into it. So, I made a date to go see the product line at Waseca, and we made a deal—that's how it got started. Last year, my son, Bill, Jr., took over and is doing a better job than I was doing."

Thanks, Bill, for this nostalgic update—and wishing you and son continued success in keeping alive one of the more illustrious and familiar names in amateur radio. And I'll say to newcomers who aren't familiar with the old Johnson equipment, just take a look around at the next swapfest. Then you'll know!

The Gem Quad's fiberglass spreaders emanating from the aluminum spider block. Note the unusual ribbed or "tridetic" construction of the arms. (W8FX photo)

Deed Restrictions

As many amateurs have found to their dismay, deed restrictions have become a fact of life in many new home subdivisions. Whereas one may pay $200,000 or more for a home on a half-acre of land in some parts of the country, it's not necessarily Nirvana as far as amateur radio operation is concerned. This is because many subdivisions, especially those featuring upscale homes, have deed restrictions that forbid some or all types of outdoor antennas. After all, who needs a TV antenna nowadays, with almost everyone on cable?

In an article by ARRL Southwestern Division Director Fried Heyn, WA6WZO, and Vice Director Dr. Wayne Overbeck, N6NB, which appeared in *The Communicator* and was reprinted in *The Westlink Report*, deed restrictions flatly prohibiting outdoor antennas have become a major problem for amateurs looking for new homes. The article described the situation on the West Coast, but the problem seem to be almost everywhere.

Deed restrictions may become an even greater problem than that of excessive restrictions on antennas by local governments. Little, it seems, can be done since FCC's prohibiting of excessive governmental restrictions on antennas doesn't apply. ARRL is trying to persuade home builders not to ban antennas, a difficult task. But the FCC may or may not take an interest in the deed restriction problem.

To make things worse, a home buyer can't usually decline to accept the restrictions and still get the house he wants, though on occasion a developer may waive the restrictions to make a sale or a homeowner's association may make a concession. Even so, neighbors can sue to enforce the rules, with the outlook for the amateur installing his antennas and keeping them up not good.

What can be done? For the moment, about all that can be done is to purchase a home in an older area, one where there are no deed restrictions on antennas. Buying a home in an area that has such restrictions, and aggressively enforces them, is asking for big-time trouble.

We'd be interested in hearing from our readers as to their experiences with such "no antennas" deed restrictions.

Vertical Antenna Technical Papers

Arch Doty, K8CFU, sent us copies of several of his comprehensive technical papers on vertical antenna design and construction. Arch's technical papers, which were prepared in collaboration with John A. Frey, W3ESU, and Harry J. Mills, K4HU, resulted from a privately funded research effort to investigate several unresolved aspects of vertical monopoles and folded monopoles, especially relating to capacitive bottom loading and impedance transformation.

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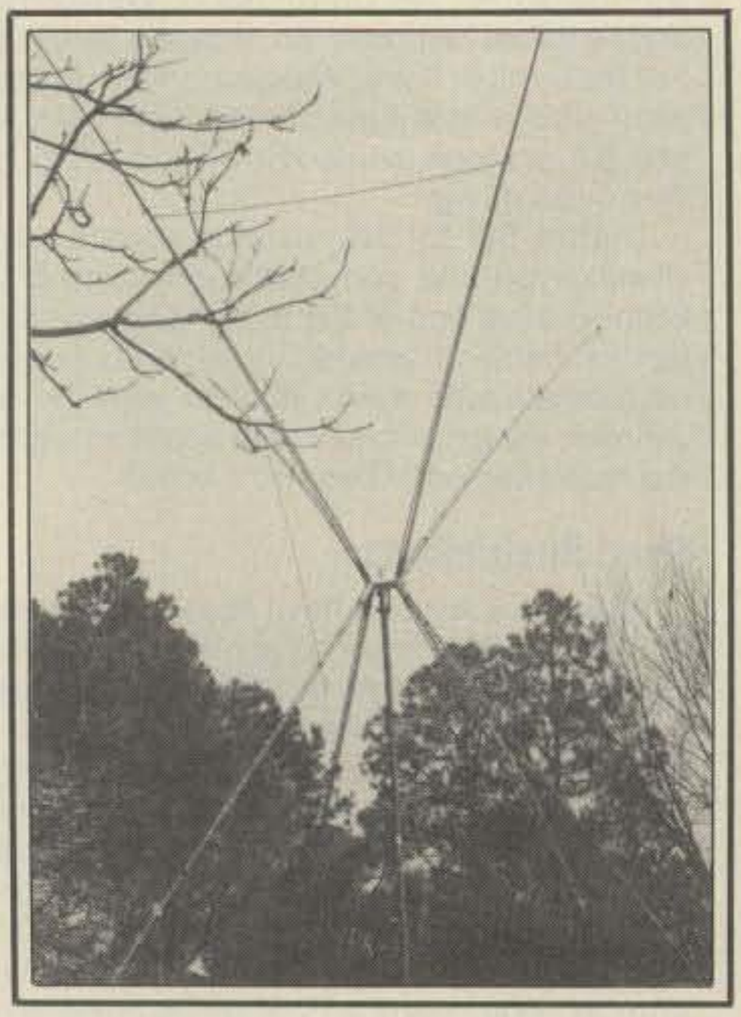


The fabricated triband Gem Quad, ready to be hoisted onto the tower. (W8FX photo)

This effort was largely a cooperative program of Radio Club of America members. Their material was originally presented at the Technical Symposium of the Radio Club of America in November, 1987. According to Arch, the three researchers have made about 30,000 measurements on various antenna configurations over the past decade in connection with this and related research.

According to Arch, the 29-page paper, "New Design and Construction Data for Vertical Antennas," should be published in part in an upcoming ARRL antenna book, likely the second edition of the *ARRL Antenna Anthology*. Also, the paper should be used to add new material on verticals to future editions of *The ARRL Antenna Book*. All this should make for some "good reading" for those with a special interest in vertical antenna behavior.

S. M. Manufacturing Antenna Products

Several VHF beams and tower sections are offered by the Canadian firm of S. M. Manufacturing, 5 Thorpe Street, Dundas, Ontario, Canada L9H 1K2.

Included in the S. M. product line are two 10-element two-meter beams (regular and wide-spaced), a five-element beam for six meters, and a six-element widespaced six-meter beam. All of these antennas are designed for 300-ohm feed, though they can be supplied with gamma matches, and they can be stacked using stacking bars. The beams are $39 to $69 (U.S.), depending on the model.

The Canadian firm also offers a complete line of tower components: 20-foot reinforced tower middle sections, a special base assembly (which is said to eliminate the costly need for a cement base except in sandy soil), and 10-foot top tower sections with rotator mounting plates to handle most popular amateur antenna rotators. The tower sections are priced from $35 to $50.

J-TEC Antenna Switch and Preamp

J-TEC has introduced the ASAP-1 antenna switch and preamplifier for receive-only use from 1.8 to 30 MHz.

The new unit features selection of up to five different antennas and three gain settings (−20, 0, and +20 dB). J-Fet and bi-polar broadband circuitry is used to provide low noise figure, good impedance match, and excellent stability over the operating range.

The ASAP-1 has four low impedance (50 ohm) inputs and one high impedance (450 ohm) input to permit the use of a wide range of antennas such as whips, loops, dipoles, longwires, Windoms, Beverages, and other types. The J-TEC unit is designed to connect to auxiliary receive jacks found on most HF transceivers, or directly to the antenna connector on general coverage receivers. Multicolored LEDs indicate the selected antenna and gain.

The ASAP-1 is priced at $94.50 plus shipping. For more information, contact Jim, KB1SH, at J-TEC, 3050 Panama Drive, Melbourne FL 32935.

HF Radio Antenna Designer

S. C. "Chuck" Smith, WA7RAI, sent me a review copy of his antenna design program for the IBM-PC and compatibles.

Chuck's program is primarily intended to compute element lengths for a wide variety of popular amateur antennas over the 1.5 to 30 MHz range. The program doesn't attempt to teach antenna design or to analyze performance. Rather, it handily computes lengths of various vertical, sloper, Yagi, loop (quad and delta), log periodic, wire array, off-center-fed (Windom), Vee beam, end-fed, and other antenna types. A nice feature of the program is that many of the computational routines are sophisticated, offering user options such as element taper (for beams) and bandwidth (for log periodics).

A portion of the program deals with feedlines and feedline matching, and includes offering various pencil-saving length calculation routines for coaxial cable that take into account velocity factor.

One caution in using such antenna software programs: designing an antenna involves numerous variables that must be taken into account; computer generated results can't take the place of final pruning and checkout. As Chuck indicates, in the interest of easy program usage, some variables have been averaged, meaning that in some cases, minor adjustment may have to be made to the final antenna design.

The HF Radio Antenna Designer is available for $30 plus $2.50 shipping and handling (U.S.A. and Canada), from Chiva Software Publishers, PO Box 1637, Chino Valley AZ 86323, or directly from S. C. "Chuck" Smith, WA7RAI, 2227 N. 13th St., Phoenix AZ 85006.

HAMRAD Amateur Radio Software

Robert H. Lieberman has introduced a series of amateur radio station software packages for MS-DOS based computers. These are grouped into the DSK1, DSK2, and DSK3 program collections.

DSK1 includes programs to provide the user with the means to determine short- and long-path antenna azimuth positioning; an enhanced logging program which includes special features such as dupe checking, scanning, sorting, and printer dumps; a QSL card print routine; and an editing program to facilitate changing your station's basic data entries used by the other programs. DSK1 is priced at $25.00 plus $2.50 shipping.

DSK2, priced at $30.00, includes a specialized contest log program, which includes fast dupe checking and country verification; an upgraded version of the logging program on DSK1 which includes a rapid data entry feature; a printer dump routine; and a utility program for converting data between log program formats.

The third disk in the series, DSK3, compiles all of the programs found on the other two disks and drives them from a master menu. This disk collection is priced at $50.

All of the programs include documentation and operate with a minimally configured MS-DOS system, though the logging programs require 512 to 640K for all program features to be operational.

For more information contact Robert H. Lieberman at HAMRAD Amateur Radio Software, 9027 Sleeping Bear Road, Skokie IL 60076.

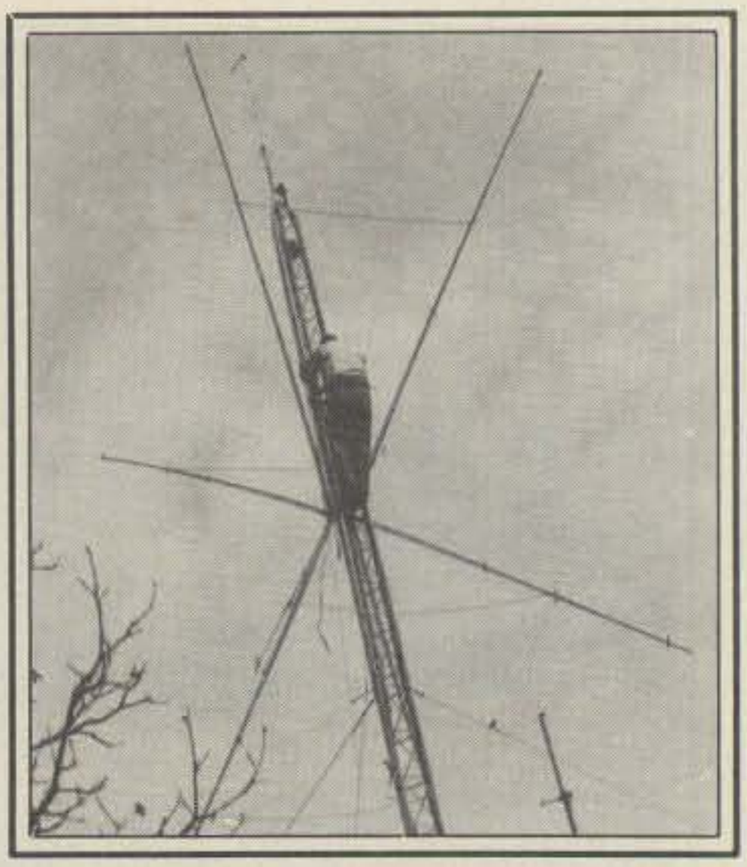
Circuit Busters

For the more technically inclined among us, Circuit Busters has introduced its newest program, a transmission line program called TLINE. This program, for IBM-PCs and compatibles, analyzes and synthesizes an extensive variety of transmission lines. Lines included in TLINE's bag of tricks include coax, microstrip, stripline, coplanar waveguide with ground plane, coupled microstrip, and coupled stripline.

For more information, contact Randall W. Rhea, at Circuit Busters, Inc., 1750 Mountain Glen, Stone Mountain GA 30087.

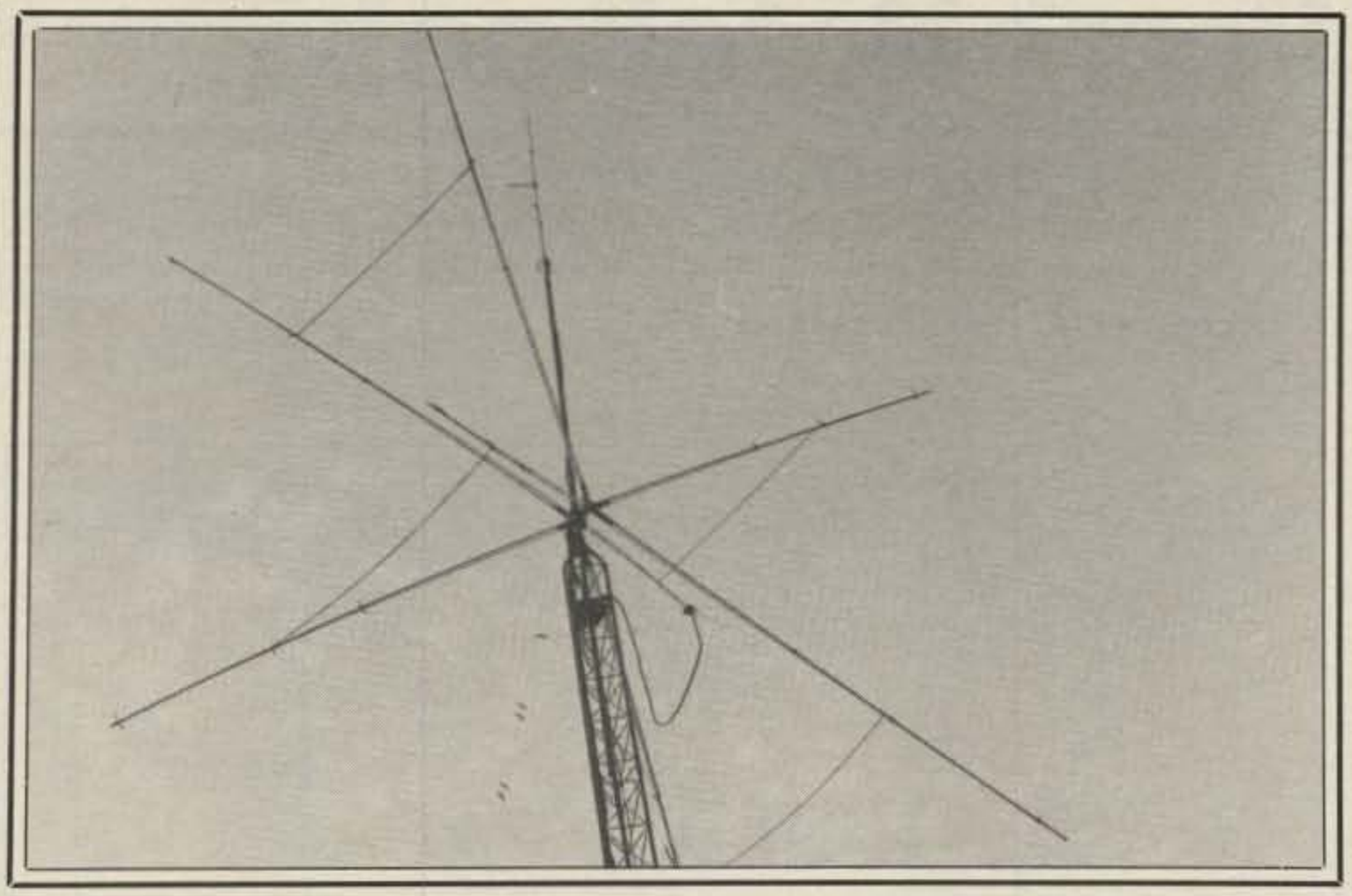
Zihua Morse 2.0

We're often asked why we don't feature more Macintosh amateur radio software in our column. Actually, we'd like to do so, but there just doesn't seem to be a great deal of Mac amateur radio software out there. Thus we're happy to receive information on software which harnesses some of the first class features and



The finished Gem Quad being shimmied up the tower using a system of ropes and halyards. We did things the hard way: a tilt-over tower would have been a real "plus," considering the basically boxy, unwieldy nature of the quad which can make installation a tricky matter. (W8FX photo)

Say You Saw It In CQ



Here's the Gem Quad in position atop the tower. Note the reflector tuning stubs in the lower left portion of the photo and the common coax feedpoint balun at the right. (W8FX photo)

capabilities of the Mac. One such program appears to be Zihua Morse 2.0.

One of the most important requirements in a Morse training program is, of course, the capability to control the speed of the code. Zihua Morse starts the beginner by sending characters at a high rate, with pauses between characters to give the beginner time to respond. This method is said to encourage learning the Morse code by the sound of the characters and also keeps the sound constant while increasing the overall speed.

Using Zihua Morse, one may start by typing the characters at the keyboard to become familiar with their sounds. Next, the random character generator may be used to send these characters in random order; just the characters from the lesson are practiced, then all the characters learned so far can be integrated into the lesson. Finally, you can practice with predesigned lessons containing words, or you can create unique lesson files.

The user typically writes on paper, then compares results by looking at the screen—or can select the characters sent, with Zihua Morse reading them back using the built-in speech synthesizer. The program can automatically keep track of accuracy and speed for each character.

The program includes a built in editor and clipboard, and it allows overall rates of from 3 to 14 WPM and character speeds from 12.0 to 24.0 WPM with adjustable audio pitch. The program is designed to run on the Macintosh 512K, Macintosh Plus, SE, or II. It's priced at $39.95, including the user's manual, MacinTalk™ speech synthesizer, and lesson files. Contact Tom Pandolfi at Zihua, PO Box 51601, Pacific Grove CA 93950.

Expert Edge

Optimistically billed as "the ultimate computer program for station operation," Expert Edge is a multipurpose integrated control, terminal, logging, and contesting program for the IBM-PC and compatibles, requiring 384K memory and two disk drives for proper operation.

The program uses multiple windows, pop-up menus, color, and graphics to facilitate station communications. The program offers complete control of your station, with coordinated switching of terminal and radio between transmit and receive, selection of operating modes, frequencies, and antenna steering advice.

Under Expert Edge, each "activity" (radio, terminal, QSO) is a separate on-screen window; pop-up menus are used to select program, radio, and terminal options. There is a worldwide DX data base with prefixes, coordinates, time zones, and CQ zones included. For transceiver control, there are 260 tunable memory pairs with complete split frequency operation, and with storage of split frequencies, radio and terminal mode, terminal speed, and an identifier. Up to six different radios may be controlled.

Terminal features include 26 rapid access memory buffers, interconnectable for contests, and a built-in memory keyer; you can write to and from disk files. Each packet connect is displayed in a separate window.

Contesting and DX features include a built-in logging program that gets radio frequency, mode, date, and time automatically, and which allows printing of logs in any format desired. Azimuth and distance between any two points is calculated, and multiple screens are used to show prefixes worked, QSO count score, and dupes.

The program is designed to work with a variety of "smart" Kenwood and ICOM transceivers, as well as most popular AEA, Kantronics, MFJ, Heathkit, and other terminal units.

The Expert Edge package is priced at $99.95 postpaid and is available from EXPERTQ, 10245 Leatherwood, Ft. Worth TX 76108.

Next month, more antennas and accessories subjects of current topical interest. See you then.

Overheard: A transistor protected by a fast-acting fuse will *always* protect the fuse by blowing *first*.

73, Karl, W8FX

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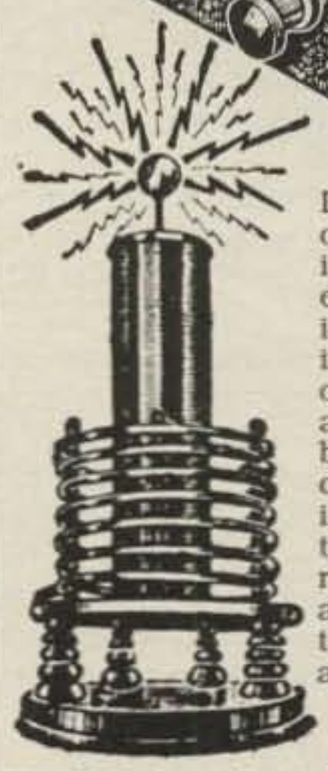

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The Packet User's Notebook

a feature by
BUCK ROGERS, K4ABT

CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

Alphabet Soup

In this year many advances were made in the rapidly moving field of data communications and especially the packet radio facet of amateur radio. Although I try to stay abreast of the most recent happening or development within the scope of this packet radio medium, I, like many of my counterparts who eat, sleep and live packet radio, sometimes get caught up in the activity of the advances and forget the absolute newcomer. Herein lies the topic of this month's Packet User's Notebook.

There are plateaus in our career or hobby where we must stop for a break and take inventory of our progress and direction. The progress in the packet radio hobby is fast moving and the direction seems to be on target. So let's think about the newcomer to packet for a few minutes.

Have we been so wrapped up in the fun and progression that we've forgotten our heritage? Let's revisit some of the activities that all of us can relate to, namely when we first decided to enter the packet radio hobby. What I am about to do is remind many of you of those first trial and error days (and nights) of packet radio. And for those of you who are just entering the packet radio hobby, you will find this topic most educational as well as entertaining.

My Humble Beginning

I was in Thousand Oaks, California to complete some of my studies and get my degree. At 42 years of age you can find many reasons to increase your knowledge in computer science. I burned the night oil studying into the late hours because everyday seemed to be another test day. While I was studying I would listen to the local ham repeaters. I remember well the first time I heard the now familiar "ripppp" of a packet being transmitted. At first I thought these strange sounds were some new repeater control being tested, but as the evening went on, so did the strange noise.

Saturday morning I paid a visit to a nearby Radio Shack and met another local ham. I asked him if he had heard the strange noise on the band? His reply was almost automatic, "Oh yeah. That's packet." "My next question was just as automatic, "What is packet?" Since that day, my entire being has plunged into this thing called packet . . . teeth, hair and eyeballs. My appetite for packet information has become insatiable.

This New Packeteers First Time

As I present this list of questions and answers, many of you old timers of packet fame will suddenly realize the many terms and definitions, which we now take for granted, were once a very pronounced obstacle to us. For this reason, I am building this month's column around the beginning packeteer.

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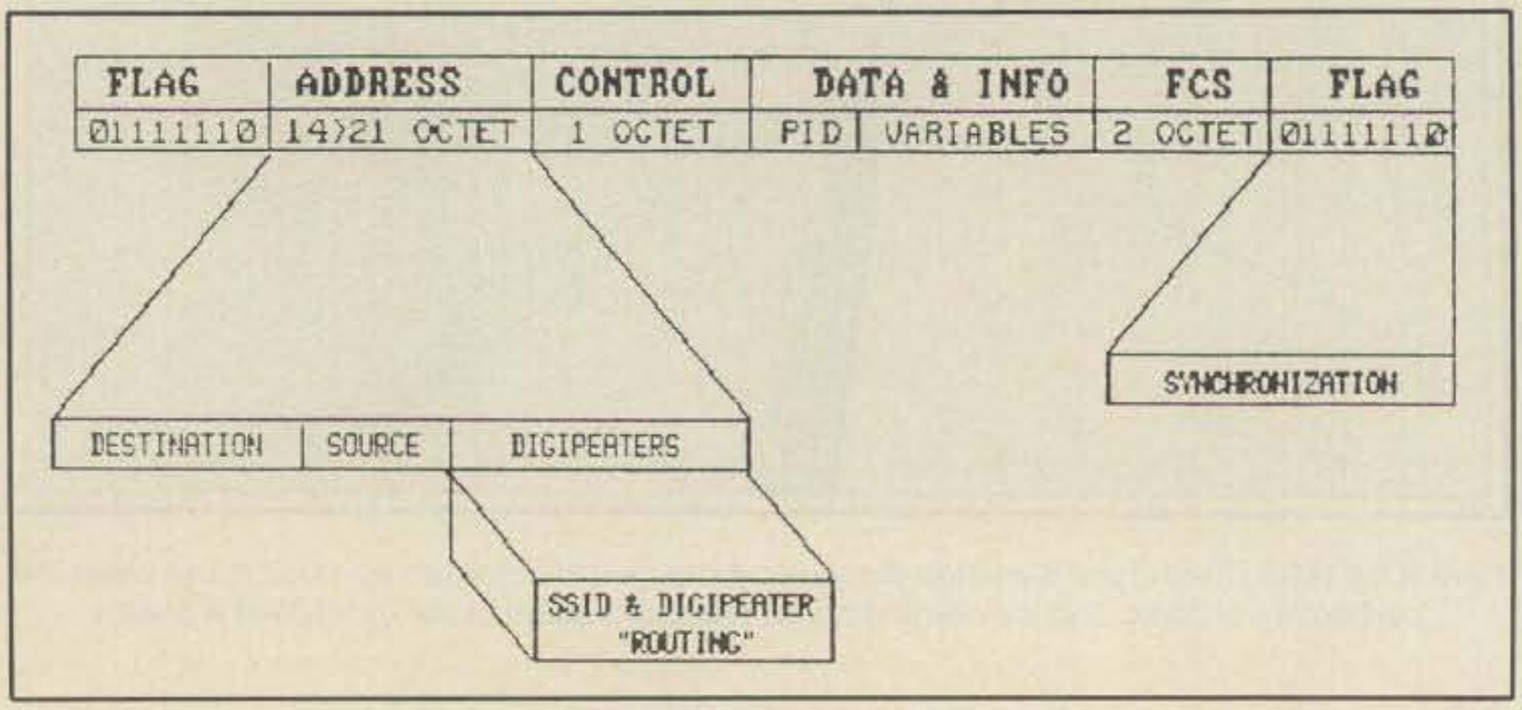

Fig. 1– The AX.25 packet frame format. Current standards allow up to digipeaters to be used for a connection. Node connecting is a more reliable alternative to digipeating over distances.

Here are 26 of the most asked questions about packet. These questions are compiled from those asked at my packet forum and seminars. These are a few of the questions which also confront the new packet radio operator in the first few days of the packet hobby. To those of you who feel you may someday have the complete list of answers to all the questions about packet radio, forget it! That will not happen. But I suppose that is what keeps our inquisitive minds actively pursuing the next phase of this wonderful facet of ham radio.

Let's take the plunge into this month's bowl of "packet radio alphabet soup" A through Z, and answer these 26 questions for our beginners (and some of the old timers who missed one or two along the way).

What is a packet? A Packet is a group of binary bit or digits which include the data and control signals. The control signals, data, and error correction is arranged and transmitted in a specific format (see fig. 1). Packet transmission using the X.25 and AX.25 protocol will provide error-free data of any kind, whether binary or ASCII.

What is a TNC or PAD? A Terminal Node Controller or Packet Assembler-Disassembler (PAD) is better known as a "TNC." This is the heart of our packet system, and performs many actions which we are never fully aware of. It is what happens to the data within the TNC that makes it so powerful. Briefly, it gives a "personality" to the otherwise senseless data.

This device is the "interface" between our computer and the outside world, not withstanding the transceiver. A dumb set (approximately 128 characters) of serial data leaves the communications port of our computer with no sense of direction and no rhyme or reason as to how it will travel or arrive if it were to make it to the airwaves. The TNC captures this stream of data and hangs several postage stamps on it, assigns it a number and gives it an address to go to. Indeed, the TNC actually provides the route that you have previously instructed it to assign to the packets. Finally the TNC slaps it on the rear with a tag which tells the TNC at the distant end where the packet came from. If this address information was unreadable, the distant end TNC remembers the address of the sender from the previous packets or the "attached tag," and can ask for another transmission of the same packet.

What is a digipeater? Our definition of a Digital Repeater (Digipeater) or just plain "digi" can be described as a device which will "store and forward" digital data. Right up front, we know that all packet stations are digipeaters, unless the digipeat command is turned OFF. For the purpose of explaining the need and use of the packet radio digipeater, we need to look at its purpose rather than its definition.

The digipeater is a simplex repeater usually located at a remote mountaintop much the same as a voice repeater would be. Because of the store and forward capabilities of the TNC, we are able to use a simple simplex repeater. The transceiver receives the packet and the TNC stores it; thus the incoming packet is complete. The TNC at the remote digi will now key the transceiver automatically and transmit the packet to the destination station or the next digi in the routing table. The digipeater differs from the home station in only one way: it will not be required to have a terminal or computer attached. A mountaintop digi will only need these items:

- A TNC
- A Transceiver
- An antenna system
- A power source

What is a buffer? A storage area or device

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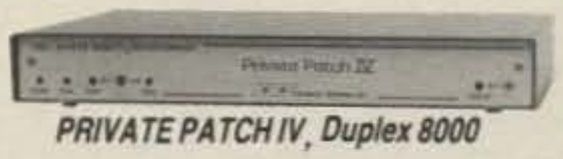

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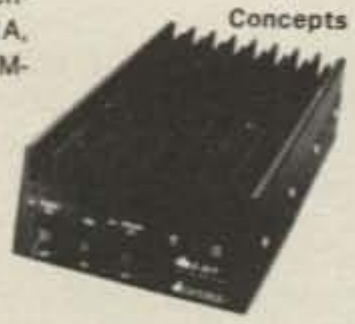

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(normally in software RAM) where data overflow is contained until RAM or disk space can be made available for storage. The buffer is mainly used to hold data while it is being transferred from one computer to another.

What does TNC configuration mean? TNC configuration applies to the initial setup of your station and installing the parameters which apply to your particular terminal and radio. Many times there are some additional "tweaking" to be added as you become more familiar with your packet station.

What is a terminal? The terminal is the Input/Output (I/O) device that allows us to send and receive data to and from the TNC. The terminal can capture and buffer the data to be saved, printed and observed on display screen or printer. The terminal can be one of many types of personal or home computers, or just a "dumb terminal" with a built-in terminal program.

What does boot mean? Boot, reboot, and system boot refer to a "cold start" of the computer or related devices. Another meaning of "boot" is to load and use a program or file. It is derived from the expression "pulling yourself up by your bootstraps."

What is DOS? Here is a question that is often asked by many newcomers to the digital data communications world. DOS in a few words refers to the "Disk Operating System" which is loaded into many computers prior to their use. (A few computers have DOS stored permanently in computer ROM.) DOS gives the computer an intelligence or personality and enables the user to execute databases and terminal programs, and perform other tasks such as word processing.

What is TTL as related to a TNC? Transistor to Transistor Logic. Some TNCs will not accommodate this form of interface. A separate signal converter is required when a TNC does not support TTL. Some TNCs have built-in TTL strapping options or connectors.

What is ASCII? American Standard Code for Information Interchange, and it's pronounced "askey." The ASCII 7 bit plus parity code. Also known as the ANSI standard X3.4 1977. The ASCII code set is used in almost all computers and the peripherals. ASCII is the basis of most information which is transmitted by amateur packet stations.

What is binary? A two state numbering system represented by the 0 (zero) and 1 (one). A binary digit is called a "bit." Digital data is represented by a one or zero bit when used in packet communications.

What is RS-232? In the computer world there exists a serial communications standard. This "standard" is called RS-232 and the latest Electronics Industries Association (EIA) revision is "C." Thus we have RS-232C as the current version. (For a detailed discussion of RS-232C and packet, see my booklet *RS-232C as Related to Packet*, which is published by the Kantronics Press.)

The DB-25 connector is sometimes recommended for use with the RS-232C standard. The connector is not directly related to the RS-232C "standard," but it does serve the purpose of being a universally accepted connector. (See the last question in this column.)

What is a bit? A bit is a notation for a binary digit. The smallest unit of digital information. The bit can represent a choice of a one or zero (mark or space) in digital communications.

What is converse mode? The converse mode is the communications mode of a TNC.

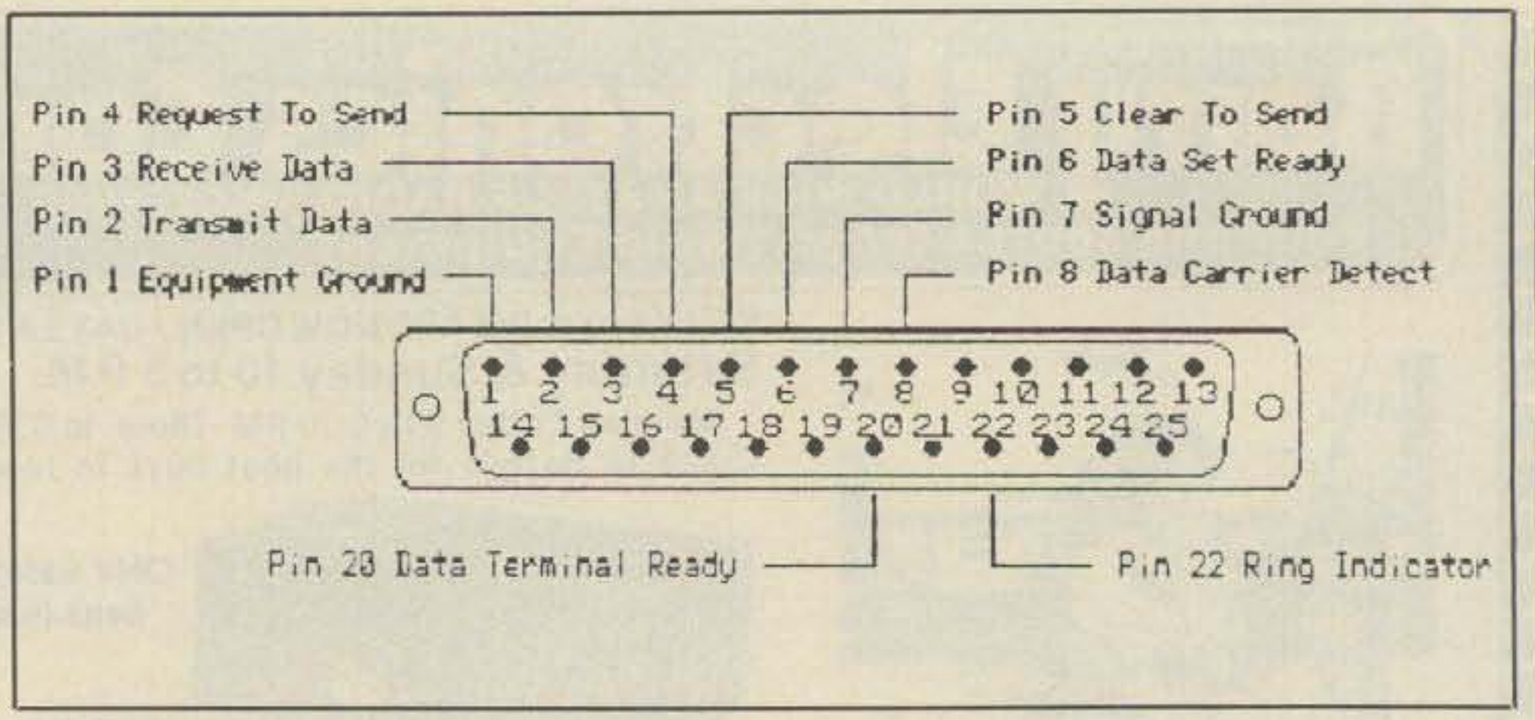

Fig. 2– In most applications only pins 2, 3, 4, 5, and 7 are used between the terminal and TNC. Some BBS interface cables will require the use of pins 6, 8, and 20. Avoid interface cables with all 25 pins connected end-to-end (straight through cables).

The TNC can be placed into the converse mode by being connected to another station or by issuing the CONV command. Once in the converse mode, a carriage return will force a transmission of a packet. The packet will follow the unproto path or the connected "VIA" path.

What is protocol? The rules for maintaining communications between similar devices. As with AX.25 maintaining orderly error-free data flow and data link control.

What is TCP/IP? Transmission Control Protocol/Internet Protocol. The KISS command activates this mode in some TNCs. This mode is not supported by software for all computers and Terminal Node Controllers (TNCs).

What is AX.25? AX.25 refers to the Amateur radio packet protocol framed in the following manner. First the data has a "FLAG" or personality bit sequence added to it. Next, there is the address field that tells the packet where to go and how to get there. A control byte is then applied to the packet which tells it how much to carry, how long to carry it, and what to bring back to prove that it has completed the mission. Refer again to fig. 1.

Meanwhile, over in the corner of the TNC is the accountant waiting for the return acknowledgement, or "ACK." This accountant has a special helper called the "FCS," or frame check sequence, to keep inventory of complaints or errors in the returned ACK. If the FCS finds a bit-count error, it will tell the accountant, and the packet will be sent again until the correct FLAG bit is returned. This final scenario gives packet its error-free personality.

What is the method to set my transmit audio? One of the big problems we have found is that many users feed a signal from their TNC to their transceiver microphone input that is too high in level, and the result is over-deviation, distortion, and in general it causes the system to respond in an erratic manner. It is good to remember that most 2 meter radios have limiter diodes somewhere in the audio path and if your input audio level is too high you will be hitting the diodes with too much audio and cause rectification of the AF. This will allow a DC component to cause an equal amount of clipping to occur. These clipped DC components that were related to the audio (once upon a time) are now going through the modulator stages of your 2 meter rig with the grace of a skunk in a theater.

Modern VHF rigs that use a condenser or electret microphone require an audio level somewhere in the range of 10 to 20 millivolts peak-to-peak. The best level to adjust for is between three and a half to four kilohertz deviation, with a "deviation meter." If you just happen to be out of deviation meters today, try the following technique:

Most KPC/TNCs have a CALIBRATE or similar command which allows you to key the rig and send a packet tone. Listen to your transmitted signal with another rig, and set the level until the perceived volume stops increasing. (Be sure you adjust the mic gain control and not the deviation control. The mic gain control is before the limiter and the deviation control is after the limiter.) At this point, you are up against the limiter diodes. Now back off the input level (level of audio from the TNC to the 2 meter radio) until you hear the perceived volume decrease. Turn it down a bit more, and you will be close enough for practical operating. The audio should sound clean with no distortion or harshness. TAPR-2 clones have an adjustment pot on the board. Kantronics TNCs have three fixed output levels selective with a jumper. The jumper can be placed into position one, two, or completely removed, for levels of low, medium, and high, respectively. If one of these settings does not work, you may have to set the mic gain control level inside the rig as described above.

What is asynchronous transmission? Asynchronous transmission indicates that time intervals between transmitted characters may be of unequal length. Transmission is controlled by start and stop bits at the beginning and end of each character.

What is "setting the timing parameters"? There are several timing parameters which you need to set properly. Check your manual for the correct millisecond timing conversions.

TXDELAY is the delay interval between key-up and start of data transmission. Normally 300–400 milliseconds is adequate (TXD 30–40), but some 2 meter rigs take a bit longer to get up to speed after the PTT/keying line is asserted. If you seem to be having a problem being heard and all else seems OK, try increasing TXDELAY to 400–600 milliseconds (TXD 40–60). RESP is the time delay between reception of a packet and transmission of an ACK, and DWAIT sets the delay between when activity is

Say You Saw It In CQ

last heard on the channel and PTT activated. You will be requested to set values of RESP and DWAIT in milliseconds, and don't forget to convert to get the correct value into your TNC. For example, if you have been asked to set DWAIT to 600 milliseconds and the units of DWAIT for your TNC are 10 milliseconds, then you would command DWAIT = 60. Finally, I use AX25L2V2 ON, and 8bitconv ON. Again I emphasize, I am not urging anyone to use the same TNC parameters as mine. The parameters discussed above are more general in application than "system specific."

What is an SSID? The SSID is somewhat related in use to a unit number as applied to the call sign of a digipeater or second, third, etc., packet stations.

For instance, the digipeaters of WB4RHO and the associated SSIDs located in central and south Alabama are: WB4RHO (2400 bps BBS MBL bulletin board system); WB4RHO-1 (145.010 MHz) Clayton, mountain; WB4RHO-2 (223.400 MHz) Abbeville, Alabama; WB4RHO-3 (145.010 MHz) Headland, Alabama; WB4RHO-7 (1200/2400 BPS) Kanode Clayton, mountain; and WB4RHO-10 (1200/2400 BPS) PBBS/Mailbox.

What is synchronous transmission? Transmission in which data bits are sent at a fixed rate, with both the transmitter and receiver synchronized. Synchronized transmission eliminates the need for stop and start bits.

What is WEFAX? Weather facsimile, reconstructed satellite pictures and photographs. The WEFAX receive mode is now an added feature of many TNCs.

What is a gateway? When associated with packet radio, a gateway is a "bridge" that provides a means to digipeat from one frequency into another or from one baud rate to another.

What is baud? The unit of digital signal speed, equal to the number of events per second. Baud is not necessarily the number bits per second. When each event represents more than one bit, it is called a "DiBit."

What is a DB-25 connector? Let's look at the DB-25 connector (fig. 2). It is easy enough to remember the name of this connector, because it has 25 pins. Of these 25 pins, there are only 10 we are concerned with. In some applications, we will use as few as 3 of them. The pins are:

1—Equipment Ground
2—Transmit Data
3—Receive Data
4—Request To Send
5—Clear To Send
6—Data Set Ready
7—Signal Ground
8—Data Carrier Detect
2—Data Terminal Ready
2—Ring Indicator

For 3 pin applications (usually associated with "software" handshaking):
2—TD
3—RD
7—SG

(Note: in all my systems, I use pin "1" to preserve the integrity of the equipment ground.)

From the 10 pins listed above, we quickly learn that only pins 2, 3, 4, 5, and 7 are suited to our needs in amateur packet radio.

That's it for this year. I hope A through Z will prove to be just the ticket for you when Santa drops in with your new Packet Controller.

Happy Christmas, and good packeting from the Rogers family.

73, Buck, K4ABT

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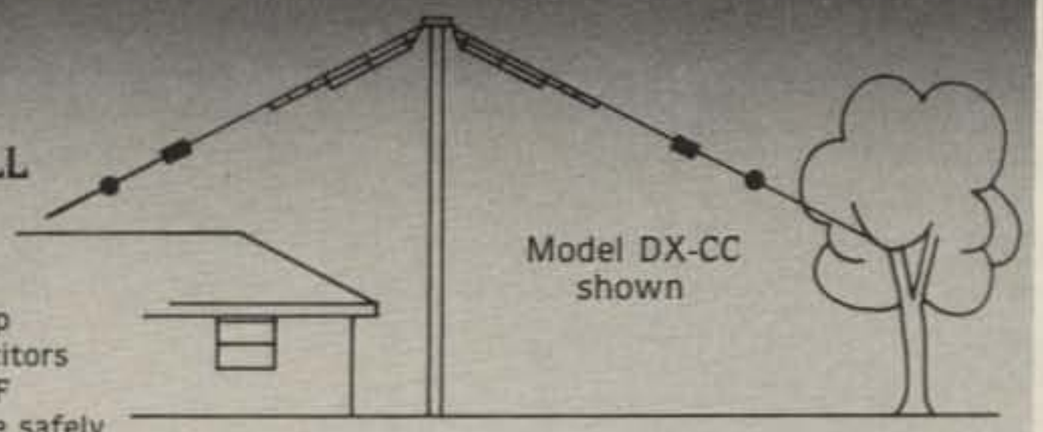

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"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Amateur Radio Stamps—Part II, Conclusion

Here is the concluding segment of this two-part article. The first part includes the scope of coverage, two figures showing stamp samples, a table of amateur radio stamps, and a table of stamps associated with amateur radio.

Variety

In addition to loose stamps, there are cachets (fig. 3), which include a design or an inscription on the envelope to commemorate a philatelic event. This article does not cover specialty items such as cachets, but such information can be requested from suppliers listed herein. Stamps can be listed as NH (never hinged), mint (unused), used fine, used good, or used second; such listings are self-explanatory. Fig. 4 shows standard symbols associated with stamps and stamp collecting.

Stamp Sets

Since I am not a stamp collector, in the usual category, I was unpleasantly surprised to learn that some stamps are only sold in stamp sets. A stamp set (fig. 5) usually consists of two to four stamps, but it can include many stamps. Usually, just one stamp in the stamp set is associated with amateur radio, but you often have to buy the entire stamp set to get the desired stamp. Fortunately, my wife (Marie, W6JEP) is a philatelist, so I give the nonamateur-related stamps to her. I hope you know a stamp collector who would like to have these extra stamps. If not, please consider donating them to the Carmelite Monastery (River Road and Central, Des Plaines, IL 60016). This group uses stamps (domestic and foreign) in their projects. I have sent stamps to them during the past several years. Stamp sets (s/s) are indicated in the lists in this article. If I know the number of a specific amateur radio stamp in a stamp set, I list it separately. This is done in case you are lucky enough to locate a source which will allow you to buy the stamp separately, rather than as part of a stamp set.

Prices

There is very little consistency in the cost of buying stamps from different suppliers. It is common to encounter price differences of up to 500 percent between suppliers. Request current price data from several suppliers and follow normal good shopping practices. If you can obtain a recent magazine about stamp collecting, write to several of the advertised companies to obtain price lists and/or catalogs. Please let me know about suppliers you find to be particularly good.

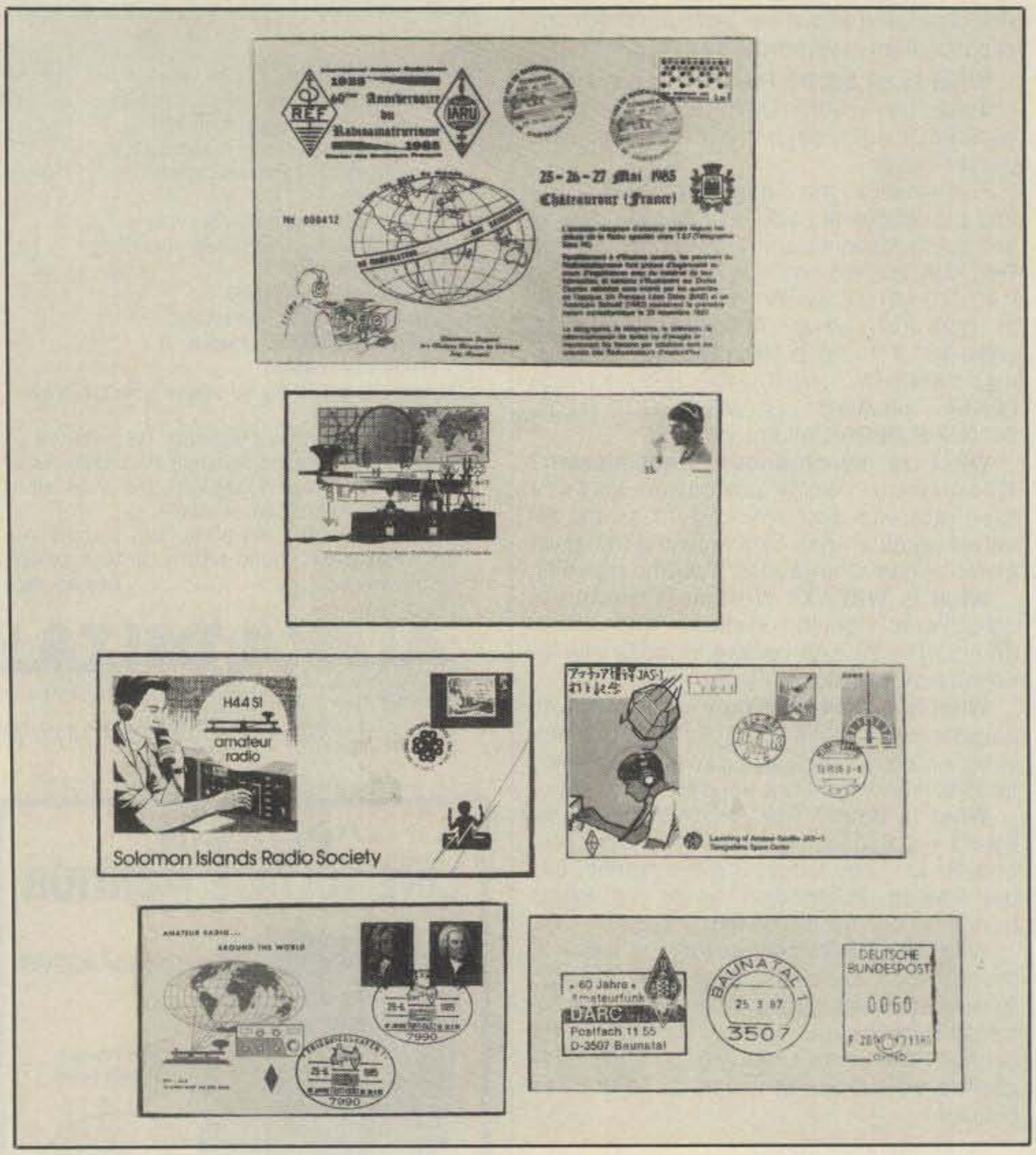


Fig. 3– Cachet samples.

Numbers

No matter which company is advertising stamps for sale, they usually refer to them by the number Scott Publishing Company uses. I have also seen Minkus numbers, but Scott numbers prevail. Scott numbers are used in this article. Scott has not sold stamps since 1985. They publish a variety of checklists which cover every aspect of stamp collecting. Scott also markets a complete line of accessory items such as hinges, mounts, labels, interleaves, and binders. If you become sincerely interested in stamp collecting, you should request a free copy of the Scott Product Guide. The address is Scott Publishing Company, 911 Vandemark Road, Sidney, OH 45365. The same number can be used to identify stamps issued by different countries. As an example, Scott 655 is a 20 cent USA stamp honoring Edison's first lamp (electric light bulb) and also a Sri Lanka stamp honoring the 55th anniversary of their amateur radio society.

Sources

I am not a philatelist. Consequently, I

2814 Empire Ave., Burbank, CA 91504

Say You Saw It In CQ

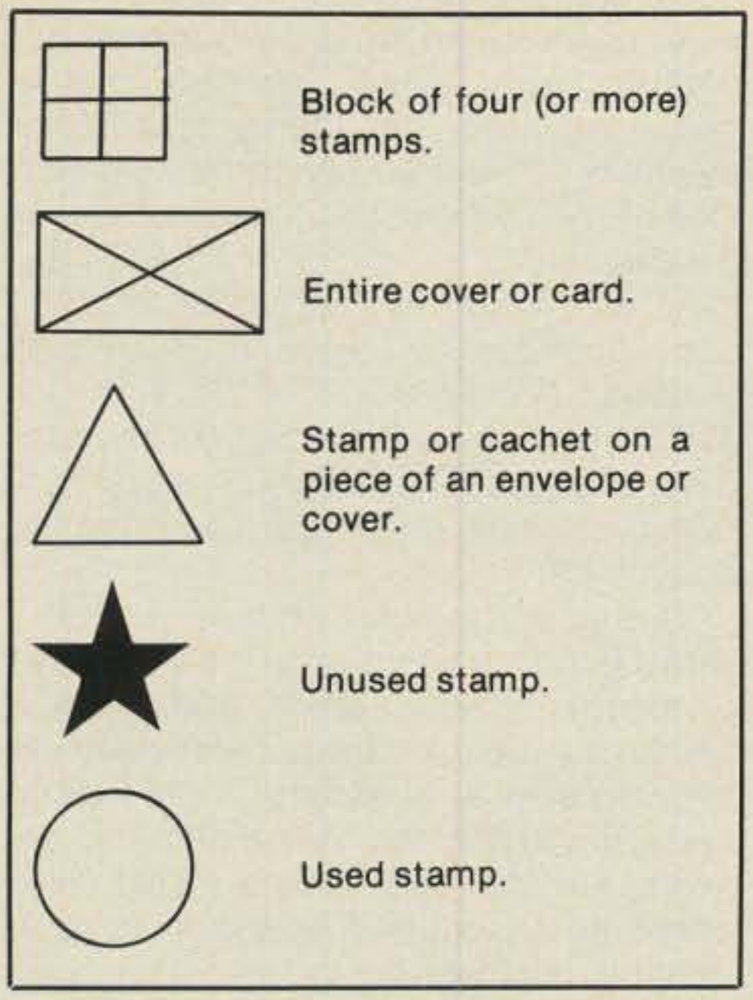


Fig. 4– Symbols related to stamps and stamp collecting.

know very few of the companies which sell stamps. The few I know are:

Brooks Stamp Company
P.O. Box 62, Homecrest Station
Brooklyn, NY 11229-0062

Herrick Stamp Company
P.O.B. 219
Lawrence, NY 11559

RJB Mail Sales
P.O.B. 160
Frisco, CO 80443-0160
c/o Roman J. Burkiewicz

West Hartford Stamp Company
126 Whiting Lane
West Hartford, CT 06119
c/o Phil Sager, WB4FDT

There are many suppliers of stamps. I counted more than 100 in one issue of *The Stamp Collector* newspaper. For a free sample copy of that publication write to Stamp Collector, P.O. Box 10, Albany, OR 97321. Another good source of such information is Linn's Stamp News, Box 29, Sidney, OH 45365. *The Stamp Collector* does not advertise a free sample copy offer, but Linn does make the offer. Your local telephone directory probably lists stamp dealers.

Getting Serious

If this brief exposure to stamp collecting causes you to adopt philately as another hobby, your amateur radio activity can be used to obtain many foreign stamps. Send notes (and postage) to DX QSL bureaus and DX QSL managers to let them know you want their spare stamps. It is better to send International Reply Coupons (IRCs) to people in other countries, in lieu of money. IRCs can be purchased in United States post offices at 90 cents each. The DX person/group can turn them in for postage at their local post office. Several DX groups offer IRCs at reduced prices.

A few foreign stamps can be obtained by adding a note to your outgoing QSL to let the DX amateur know that you are a stamp collector; however, this approach is not as likely to bring in as many stamps as bureaus and managers can provide. If your financial situation allows you to mail cards directly to DX amateurs, it is wise to use commemorative postage stamps; the large-denomination stamps are particularly welcome to DX collectors. If you make an arrangement to swap used stamps with other collectors, you can accumulate an extensive assortment of stamps at low cost.

Except for those using a rubber-cement-type glue, stamps can be soaked off envelopes quite easily. Separate envelopes by color. Cut stamps off envelopes, leaving a paper border of about ⅛ inch around each stamp (or group of stamps). Soak stamps of one color envelope paper separate from stamps on any other color envelope paper. Soak stamps in a basin (or sink) filled with cold tap water until they easily peel off the envelope paper. Place each removed stamp face down on a towel and leave it there until it dries. If a stamp is allowed to dry face up, some residual glue could cause it to adhere to the towel.

You may acquire more of the most common stamps than you need. Such stamps could be passed along to other collectors, or to groups which sponsor philatelic activities, such as schools. In some cases, a DX manager/bureau will offer to send stamps in exchange for small items; this is particularly true when they are not stamp collectors themselves. Such exchanges are usually acceptable, but they should not be allowed to get out of hand.

Summary

I will be glad to receive information to update this article. It was difficult to obtain the data in this brief article. Stamp collecting is extensive, and it can be very expensive. Nevertheless, stamp collecting is an excellent adjunct to amateur radio. It does not involve much effort or expense to attain a satisfactory collection of amateur radio stamps, and that is what this month's article is about.

1884 Manual

If you are a true fan of telegraphy, you may be interested in acquiring an authentic reproduction of the J. H. Bunnell and

Fig. 5– A stamp set wherein just one stamp is directly related to amateur radio.

Company's 1884 version of *Students' Manual for the Practical Instruction of Learners of Telegraphy*. This 48-page manual provides a window into the early days of telegraphy. Copies may be ordered from Mr. L. A. Bailey, 909 South Evergreen Avenue, Clearwater, FL 34616. Each manual costs $6.50 mailed to U.S.A. addresses, and $12 (international check) mailed to other countries. This is truly an investment in history.

Catalog

If you would like to have a 44-page catalog on amateur radio equipment, send $1.00 to Universal Radio, 1280 Aida Drive, Reynoldsburg, OH 43068. The dollar is refundable if you make a subsequent purchase.

Radio-Wave Propagation

Robert Brown, NM7M, has made it easy for amateurs to produce up-to-date propagation predictions using their personal computers. His book is primarily directed toward amateurs who want to work long distances (DX) using low power (QRP). However, the information in his "The QRPer's BASIC Propagation Tool Kit" is useful to Novice through Extra class amateurs. His approach features the following modules: (1) distance/heading, (2) path hops, (3) solar zenith angle, (4) intermediate latitudes and longitudes,

From Pleasant Shade, Tennessee, shown here are (left to right) 9-year-old Hope, KC4DQV, and 10-year-old Robin, KC4DQU. They are the daughters of Vickie, KC4DQT, and Ricky, KA4BOT, Givens. The girls obtained Novice licenses during January and they upgraded to Technician licensees in April. They are both working hard to earn WAS and DXCC awards.

(5) D-region loss, (6) maximum usable frequency, (7) F-region algorithm, and (8) signal strength. This propagation predictions book is available from the QRP ARCI Candy Store, c/o Bob Spidell, W6SKQ, 45020 North Camolin Avenue, Lancaster, CA 93545. It sells at $6.50 each, postpaid to U.S.A. addresses, and $7.50 to foreign addresses.

There is a delay between the time when propagation predictions are prepared and when they appear in print. Preparing your own predictions provides up-to-date data that is more correct than information printed in amateur radio publications.

My March and April 1980 columns provide an introduction to the subject of high-frequency radio-wave predictions. If those issues are available to you, I advise you to read this coverage. If you do not have access to these 1980 issues, you are welcome to request a free copy of the article by writing to my California address. If you do so, please state what you want and include a self-addressed stamped envelope.

If the idea of low-power (QRP) operation interests you, my May 1981 column contains a good introduction to this subject. If you want a QRP ARCI (Amateur Radio Club International) data sheet and application, you can request them from Robert Brown, NM7M, 504 Channel View Drive, Anacortes, WA 98221.

Novice License Home-Study Manual

Most prospective Novices can locate local groups (usually amateur radio clubs) that conduct amateur radio operator license preparation courses. Course opportunities are usually known to salespeople at amateur radio supply stores. However, some people do not have access to such courses, and they have to study on their own to get ready to pass the code and written tests. There are many license manuals and theory text books available to help you become licensed. One of the best books for newcomers in the *Beginner's Handbook of Amateur Radio*. It was written by Clay Laster, W5ZPY, and is published by Tab Books (Blue Ridge Summit, PA 17294-0850). It sells for $16.95, plus any taxes, shipping, and handling charges. The 400-plus pages contain many line drawings, photographs, and tables.

This paperback provides newcomers with a good introduction to the early days of electricity, electronics, and radio. It takes you through each subject you must know to answer questions in the written test. All Novice test questions and answers are included. They are split up to conclude associated coverage in each chapter. It includes coverage of the operating modes and frequencies recently awarded to Novices. It is the best standalone manual I have seen to help prospective amateurs become licensed Novices.

Novice Pictures and Articles

This column frequently includes a request for pictures of new amateurs. The American Radio Relay League (ARRL) has expressed an interest in receiving short articles from Novices regarding their amateur radio experiences. Such articles will be reviewed for possible publication in *QST*. Good black-and-white pictures are desired with these articles. If you have a story to share, send your submittal to Joel Kleinman, N1BKE, ARRL, 225 Main Street, Newington, CT 06111.

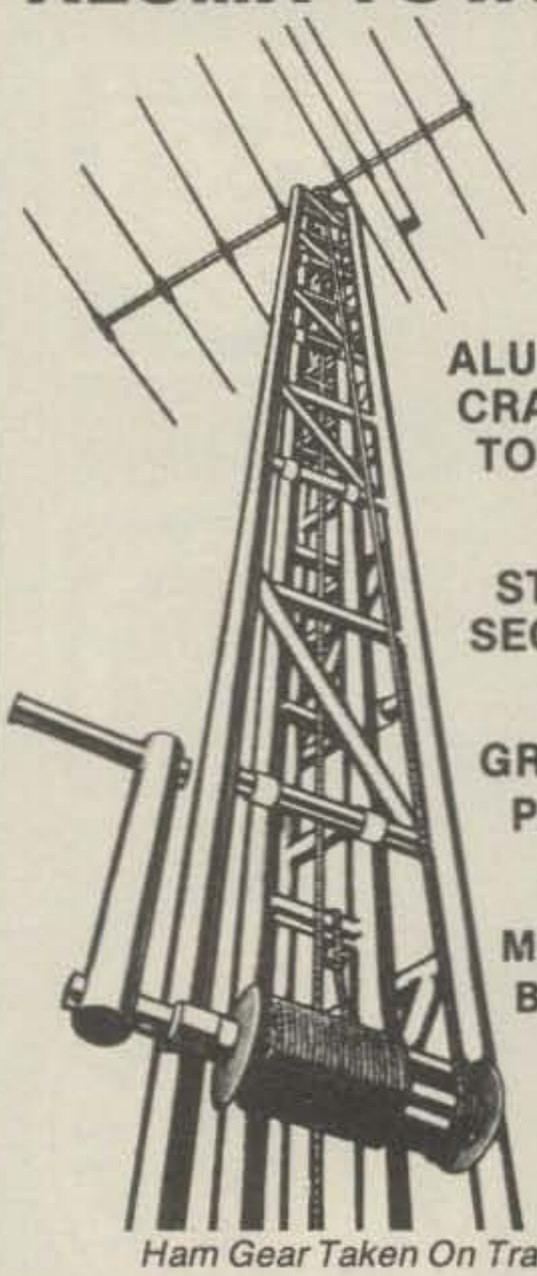
Please do not forget that *CQ*'s need for pictures continues. Pictures for this column should be sent to the California address at the beginning of this column.

Printed Aids

Previous Novice columns contain information that is useful to new and aspiring amateurs. Many of these items have been reprinted for distribution to students of licensing courses I instruct. For ease of use, these printed aids have been separated into six categories. These categories are introduction, code, theory, station, operating, and miscellaneous. Outdated items are continually replaced with newer material. Fifteen dollars brings a complete set of current printed aids, including shipping costs. A list of these printed aids will be sent to anyone who requests it and sends a business-size (#10) self-addressed and stamped envelope to my California address. Licensing-course instructors are welcome to revise and/or duplicate these items to suit their requirements.

73, Bill, W6DDB

ALUMA TOWERS



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World of Ideas

a monthly feature by
DAVE INGRAM, K4TWJ

A LOOK AT THE WORLD AROUND US

Holiday Gifts For Amateurs

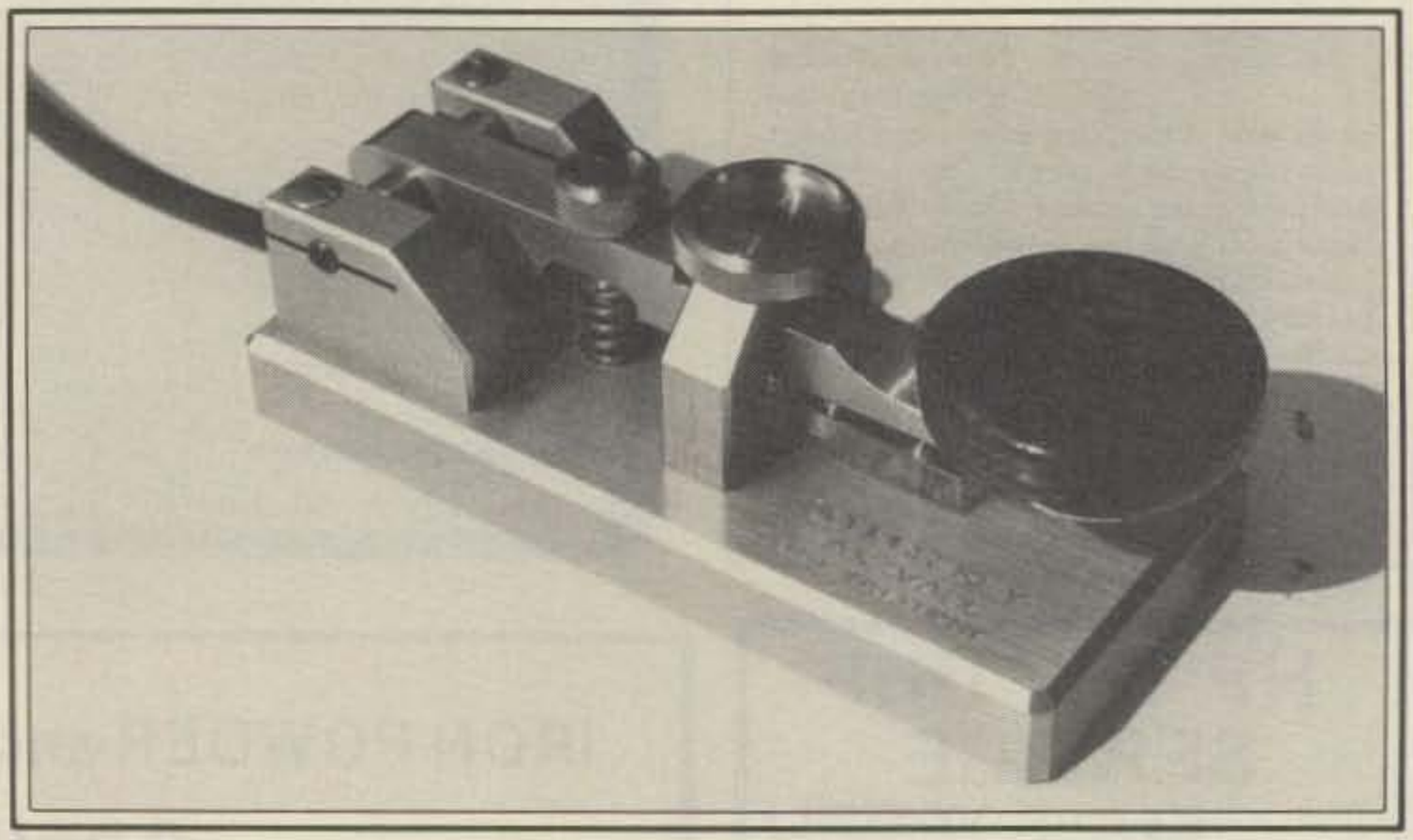
Super Season's Greetings to the greatest folks in the world—our outstanding friends, fans, followers, and column readers everywhere! Your support has been tremendous, and 1988 has been a banner year for all aspects of amateur radio. This holiday season is the perfect time to celebrate its many rewards. In view of those facts, this month's column once again makes its traditional diversion to feature special Christmas gifts just for radio amateurs. Future columns will continue with more views of OSCAR satellites, classic rigs and keys, hot happenings on today's bands, etc. Meanwhile, settle back and enjoy our brief views of new or often overlooked yet quite attractive goodies for your setup. There is something here for everyone, and it's all guaranteed to make your on-the-air operations even more fun and successful!

Our featured items are available directly from their manufacturers or dealers. Availability and ordering information are included at the end of each featured item's discussion.

This has been a good year for amateur radio. New towers and beams went up at home stations across the country, and ultra-deluxe transceivers entered shacks in record numbers. OSCAR 13 was successfully launched into orbit, and plans for several mini satellites to favor packet radio were finalized for launch during 1989. Novices began working the world as increasing sunspot activity opened 10 meters SSB, and numerous restored classic rigs driven by great-sounding fists appeared on 30 meters CW. My new books *Golden Classics of Yesteryear* and *Oscar Satellite Revue* became reality during the summer (I recently contracted with MFJ Enterprises, Inc. on printing and distributing, so the books are now available nationwide), and *CQ*'s new *Buyer's Guide* came out in full glamor during early fall.

If your amateur radio activities were a mite slack during the summer, now is the ideal time for renewed interest. The bands are hot, and everything is jumping with action. Come on in and join the fun.

Now let's take a closer look at some special attractions for increasing your operating enjoyment.



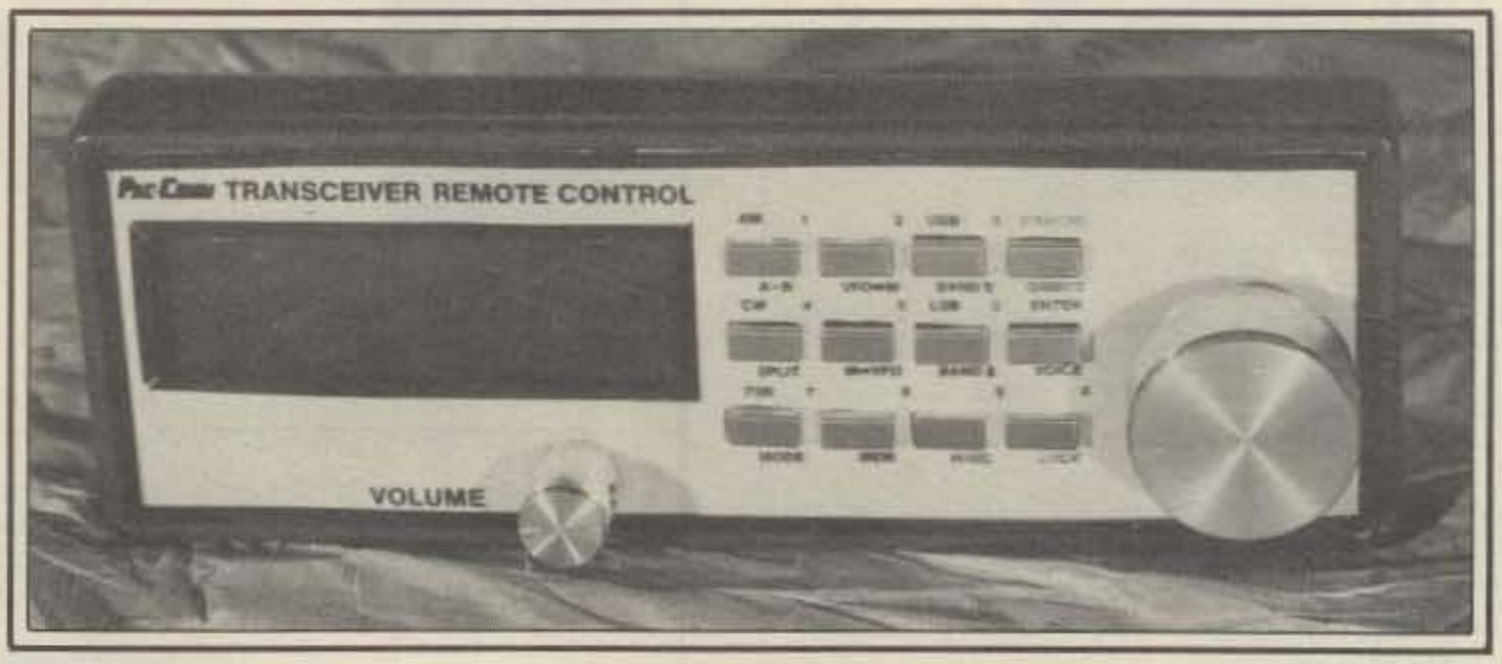
The new Schurr Mobil Key. This handmade masterpiece looks like jewelry and feels like fine silk. A true collector's item!

Special Features

Leading this year's collection of holiday delights is the brand-new handmade Schurr Mobil Key. This little gem is an immaculate work of art. Its all-brass construction and diamond polish create a beautiful finish similar to fine gold. The inscription name "Schurr Key Made In Germany" appears on its heavy base, and four tiny padded feet are on the bottom. All adjustments are precise and include locking nuts so you can use it anywhere and give it a workout without worry. The key is so attractive, however, that it seems more at home in a plush office than in a basement shack.

Schurr's Mobil Key measures 3½" L × 1½" W × 1¼" H and has the feel of true German craftsmanship. I gave the key several fun runs in my car on 30 meters CW and it worked like a champ—even balanced on the seat. A good point about hand keys for portable or mobile use is you don't worry about a (keyer) battery dying.

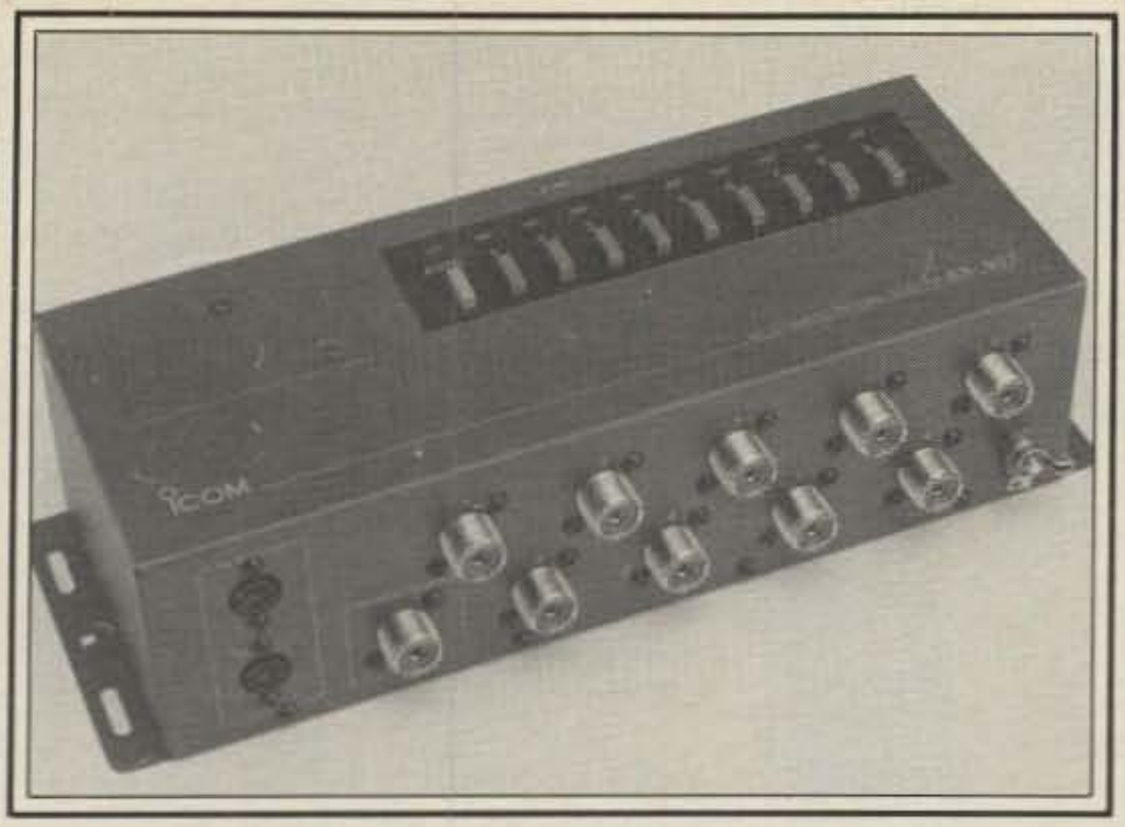
These collectors'-item keys are made



Pac-Comm's new HF transceiver remote control. Now you too can go mobile in a Ford Festiva or operate your home rig from the jacuzzi.

Eastwood Village No. 1201 So., Rt. 11, Box 499, Birmingham, AL 35210

Say You Saw It In CQ



Take a close look at this antenna selector from ICOM. It's all automatic. Just select a band on your transceiver and the EX-627 connects the right antenna.

What's the feedpoint impedance of your new antenna, the length of a ¼-wave phasing line for 20 meters, or the value of that unmarked condenser you are about to use? This Tennatest Bridge has the answers!

one at a time by Mr. Schurr in his home workshop and are distributed by Klaus Gramowski, DL7NS, Kaiserin-Augusta-Allee 91, D-1000, Berlin, 10, Germany. They are supplied with a small gold chain and tag stating handmade Schurr Key. They are not mass-produced, and there is probably a small waiting list, so jump quickly if you want one for Christmas. Airmail between Germany and the U.S. usually takes three to four days.

Another new and unique item with over a dozen clever applications is Pac-Comm's just-announced RCH-1000 HF transceiver remote-controlling system. As you probably know, Pac-Comm is the popular Florida-based manufacturer of packet radio TNCs and accessories.

The RCH-1000 consists of a transceiver interface box that installs near the rig, a control unit and speaker enclosure for remote mounting, and interconnecting cables. The control unit measures 2¼" H × 7⅜" W × 1" D. It includes tuning and volume controls, LCD readout of frequency, memory, etc. It connects to the speaker enclosure via a coil cord, and you plug in a mike and key to complete the system.

The RCH-1000 contains software that supports all popular Kenwood, Yaesu, and ICOM transceivers employing digital tuning concepts and a computer interface port. Remote-control functions are tremendous: mode, frequency and VFO selection, memory programming and recall (the RCH-1000 has 100 memories regardless of its connected radio), split-frequency operations, general-coverage/amateur-band switching, and rig on/off controlling. Whew!! The system is supplied with a 20 foot interconnecting cable for mobile use, and an optional 100 foot cable is available for home operation.

Finally, we have a safe and space-effective way to enjoy HF mobiling in a "built-into-dash" custom manner for small cars. I've also measured and found 100 feet of cable will stretch from my shack to the bedroom. Pillow speakers are readily available, and Schurr's Mobile Key is mouse-quiet. Check with Pac-Comm, 3652 West Cypress Street, Tampa, FL 33607-4916 (telephone 1-800-223-3511) for more details and availability of the RCH-1000.

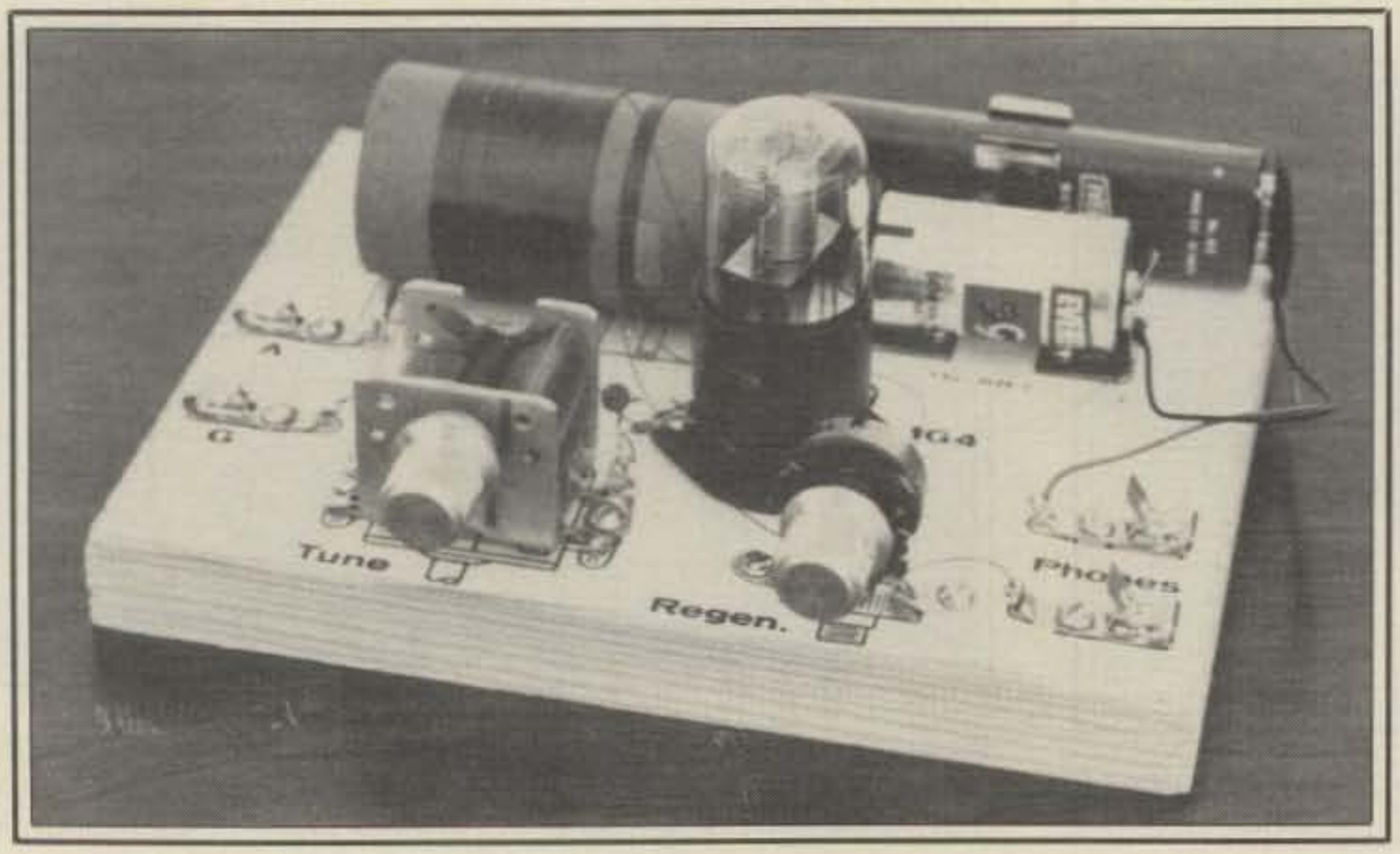
Antenna Assistants

Our next item is especially designed to clean up any station's rats' nests of antenna cables and to significantly expand your operating pleasures. ICOM's new EX-627 is a fully automatic HF antenna selector that works with all ICOM HF transceivers. The unit mounts on your desk's side and connects to your rig via its "ACCY 2" socket. When you change bands, the EX-627 automatically connects the proper antenna to your setup. Small switches under a top hatch let you preselect skywire choices according to your antenna farm. After connecting your 80 meter sloper, 40 meter vertical, 30 meter dipole, and triband beam, you can operate like they are all one antenna. Nice, and it gets all those cables off the carpet for easy room cleaning. The EX-627 is available from ICOM dealers nationwide.

Another idea with a thousand good uses in any home, mobile, or portable station (or home construction workshop) is the Tennatest RF Bridge. I've seen over a dozen good noise bridges and reactance testers, and they all work very well, but this unit is something more. Follow along with me as I describe its all-purpose functions.

First, the Tennatest is a noise bridge for measuring resonant frequencies and antenna impedances from 10 to 400 ohms and from 1 to 150 MHz. It even includes a tone generator, so it works with

MFJ's new 986 Differential T Tuner uses only two knobs, reduces SWR to zero, and has an average and peak-reading wattmeter.

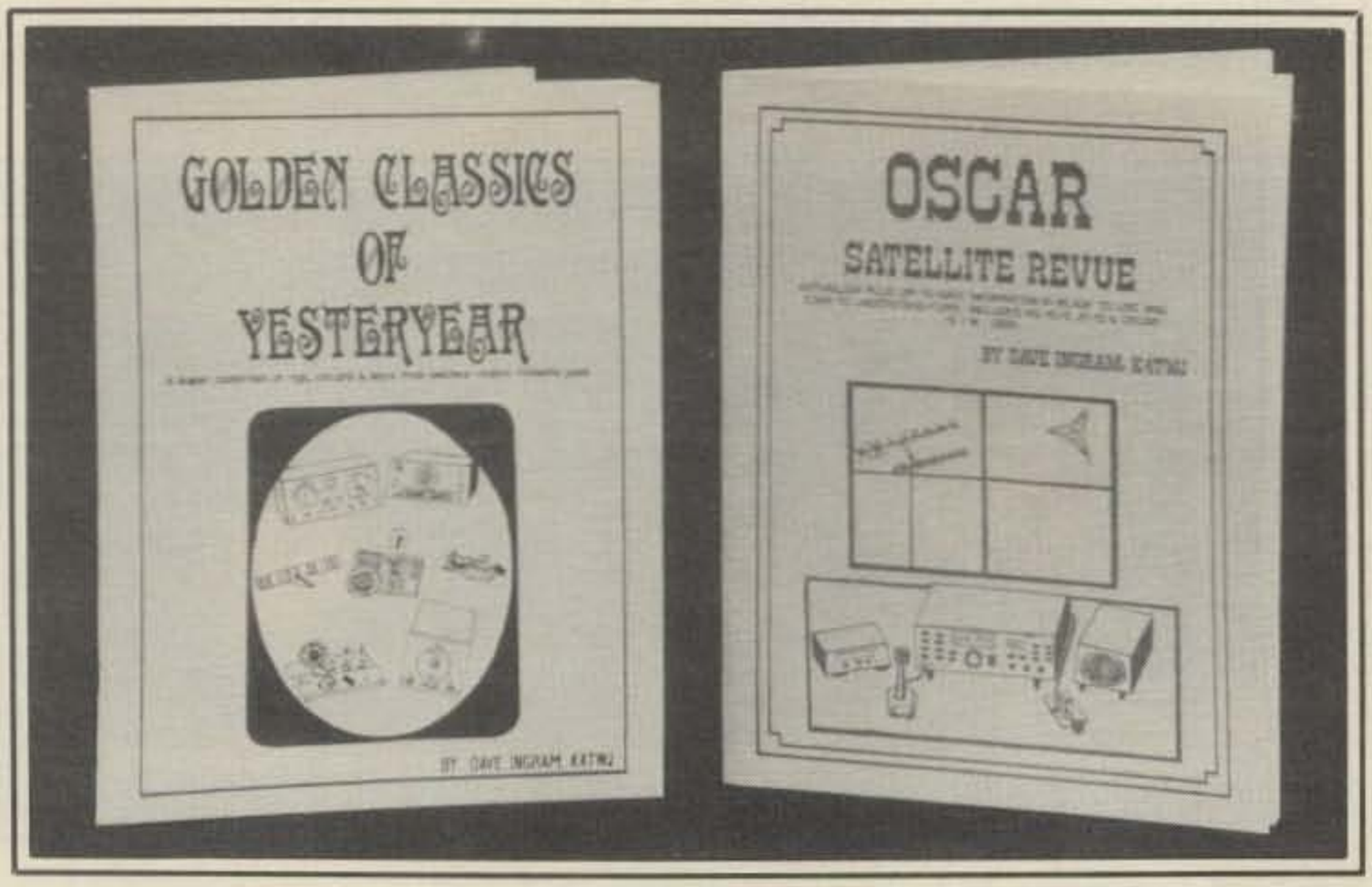


Tune in those classic "Big Band" sounds and amateur signals from yesteryear with this one-tube hummer of the 1930s. You may have to let it play for a week before all the nostalgic sounds clear from its grids, but you'll love it!

2 meter FM rigs. The little gem can be used with whips, beams, longwires, dipoles . . . . You name it! The bridge can also be used for presetting your antenna tuner's adjustments before transmitting a signal. Just insert it "between" your tuner and transceiver, set it for 50 ohms, and tweak your tuner for the lowest S-meter reading. Nice! The Tennatest also measures electrical lengths of coax and twin-lead lines with ends open or shorted—perfect for those phased arrays.

The Tennatest's other fancy points are measuring unknown capacitance or inductance and finding the resonant frequencies of homebrewed series or parallel tuned circuits. A coupling loop like the old grid dipper is not required. What a boon to classic old-time rig enthusiasts! Using this gem, you can wind Hartley or TNT coils and know "where they are" before "slop over" (as it was called in 1935) occurs. This nice little item is available from Certified Communications, Route 2, Pittman Road, Landrum, SC 29356 (phone 1-800-727-WIRE).

Antenna tuners are always popular items in today's world of solid-state rigs and multiband operating, and MFJ's new 986 3 KW Roller Inductor unit is a beauty. Notice only two knobs are used, thus simplifying tuning and making perfect matches a snap. Just "roll off what you need," adjust the differential capacitor, and transmit. The 986 also includes an average and peak-reading wattmeter, cross-needle SWR bridge with 300 and 3000 watt ranges, and a new current-effective balun. It represents a lot of hefty components at a fair price. The MFJ 986 is available from amateur radio dealers nationwide.



My own new books Golden Classics of Yesteryear *and* OSCAR Satellite Revue *are now available from MFJ Enterprises, Inc.*

Just For Fun

How long has it been since you breadboarded your own receiver? Interesting thought, eh? Ah, yes, those beautiful days of yesteryear when tales of the "Green Hornet" and "The Shadow" filled the airwaves live again! Our special find in this category is a little one-tube receiver kit of Antique Electronic Supply. Notice, gang, genuine Fahnestock clips, and you get to wind your own coil. Hallelujah! Although I haven't yet found time to rig one of these little classics for 30 meters, I am sure that time is rapidly approaching, and what a match it will be for our 1920 Hartley transmitter! Visualize the glamor of an all-breadboard station using piles of 9 volt batteries for power. Work Australia with that and you really have something to crow about. Yes, indeed! The operator, not the rig, makes the difference! The one-tube receiver kit is available from Antique Electronic Supply, 688 West First Street, Tempe, AZ 85281. They also carry old-time parts for rigs.

Stocking Stuffers

Wrapping up this year's views of fun goodies are several good printed items for expanding your amateur radio enjoyment in 1989. First, there is *CQ*'s new *Buyer's Guide*, which is filled with new rig views, dealer listings, and "how to" guidance on antennas, rig features, and operating. Want to know who takes trades or what is the difference in IF Shift and Passband Tuning? It's all in the *CQ Buyer's Guide*, and I am proud to be a contributor to that.

Another great gift that "keeps on giving" is a year's subscription to *CQ*. Just tear out the order form herein and mail it to *CQ*. Give one to a friend. Better than shopping for rinko ties, and no one exchanges *CQ*s because there is nothing better!

Finally, my own new books, *Golden Classics of Yesteryear* and *OSCAR Satellite Revue* are now available from MFJ Enterprises; call toll-free 1-800-647-1800 (or from MFJ dealers). Be forewarned, however. The books are full of dandy ideas and designs to get you rolling in fun areas. You may be working OSCAR 13 with new rigs and operating 30 meters with 1930-style gear before January 1989 after reading them.

That winds down this year's Christmas special, and we wish all of you the very best in all endeavors. Until we meet on 30 meters one weeknight or on 20 SSB some Sunday afternoon . . . .

73 and Happy Holidays, Dave, K4TWJ

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RS-12A	9	12	4½ x 8 x 9	13
RS-20A	16	20	5 x 9 x 10½	18
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VS-50M	37	22	10	50	6 x 13¾ x 11	46
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*ICS—Intermittent Communication Service (50% Duty Cycle 5 min. on 5 min. off)

CIRCLE 67 ON READER SERVICE CARD

DX

a monthly feature by
HUGH CASSIDY, WA6AUD

NEWS OF COMMUNICATION AROUND THE WORLD

Then they heard his linear's thunder,
Heard his call so often uttered,
Calling, calling through the QSOs.
"Pleasant is the sound!" he shouted.
"Pleasant that I'm in your logbook.
"What's the call sign? I don't read it.
"Name the QSL route; I have no Callbook . . . ."

This is December, a time for DXers to perhaps think of other things, those things of the season and time of year—things such as the need for longer daylight hours to work on antennas, time to recover from the *CQ* World-Wide DX Tests, and time to think of the family. Time to think of family and how plans should be made now so that their needs will not be in conflict with the Great Days of DXing in the new year.

December is also a cold and wet month, hardly the time to consider working in the garden. But since summertime puts so many demands on a DXer's time, it's unfortunate that when the time comes for such garden work it's December and it takes more than just a month to clean up the summer's debris. December is a time for contemplation—DX contemplation, and maybe even another perusal of the new *CQ 1989 Amateur Radio Buyer's Guide*. It's a time to ensure that the shack meets the requirements of the state-of-the-art level inferred in the FCC regulations. December should always find the DXer home and ready to greet old friends and exchange the wishes and good feelings of the seasons, ready to greet all those DX friends in his shack, naturally. December makes a lot of demands on the DXer. It is arduous duty, but someone has to do it, and DXers are always ready to volunteer.

Last week we were starting right in on the December's stipulated DXer mandates when the Old Timer came slopping down through the light rain marking the end of a Pacific system that had blown in a couple of days earlier. "The wind is shifting to the north," he advised. "The back of the low-pressure area is passing and it will be clear by evening." Even better than Willard, the Old Timer knows that there is changeable weather west of the Rockies, and it is sometimes a bit less than ". . . grand west of the Great Divide!" There have been times when we suspected that the Old Timer has even tried to direct the west-bound storm tracks across the Pacific, without success as far as we know.

We sat and talked of a number of DX things. DXers never lack for stimulating conversation, and along the way we mentioned the long-time club member we both knew and who, again, was waxing indignant over the direction of the club activities. "I am not paying any more dues," had been his firm declaration. "A couple of years back they raised the dues so as to have funds to relocate and upgrade the club's 2 meter repeater. We continue to pay the big

77 Coleman Drive, San Rafael, CA 94901

It is said that married couples after a half-century tend to look alike. Maybe you are skeptical about that, but have you ever stopped to note how DXers tend to fit the same mold? Here are members of the Bavarian Contest Club which was multi-multi in the CQ WW DX Test this year signing HB0CZS. This photo was taken previously when they signed HB0/DL8OH. From the left are DL8OH, DK3RG, DF4TD, DK8MZ, DL6RAI, DF7RX, DF9YY, and DK2OY. They are regulars for the CQ WW SSB Test. And don't they look like a lot of DXers you know?

bite in dues, and all they are doing is spending money on the old repeater at the old site. On top of that, hardly anyone is announcing any DX on the repeater any more. The club has gone to pot, but I'm not going with it nor am I going to help finance their journey!"

With such a four-square declaration of principle, who would doubt that DXers ever lack for stimulating conversation? Stimulating conversation about stimulated grievances, and we heard this one hardly two weeks back. "Did you mention that a lot of the DX announcements are being filed on the local DX packet hook-up on 2 meters?" the Old Timer asked, and we did remember that it had been mentioned. "He claims that he is too old to start meddling with that computer stuff," we advised the Old Timer. "Even the message storing capabilities for DX announcements would not interest him. He says that he is too busy with some real important things. One thing he mentioned is hunting down a filament-to-grid short in his 32S1. Things like that."

The Old Timer did not say anything. He just looked out the window and across the valley at the heavy clouds still on the ridge. "When the clouds move upward across a mountain, you can expect good weather," he commented. Then he continued, "I can understand his thinking. It was not too long ago when I was digging around in the storage cabinets and I came across my old Clegg 22er. It still looks good and clean. I wondered why I had ever put it in storage."

There was a glint in the Old Timer's eye, and we also started to wonder why one would put a good piece of gear in storage. Then we remembered that the 22er was a crystal-controlled 2 meter AM rig. Times have changed. FM rules on 2 meters and even packet radio have left their imprint, as have amateur satellites. These days there might not be too much hospitality shown for an AM rig in the 144–148 MHz corral. Maybe even storage was a logical repository for the gear.

We knew that the Old Timer had long resisted any belief that his current gear might be considered the ultimate in technical development. Most DXers can remember when one brand of gear or another was considered the hot item absolutely essential to any worthwhile DXer to maintain his position. Some of these rigs were quite innovative with new features, some of which did not work at all, or at the best only worked occasionally. Others were so well designed and built that they tended to last long beyond their expected years of service. We talked about these things and how beneficial it would be to a DXer if he also held a PhD in electrical engineering. The Old Timer laughed. "A BS degree probably would suffice," he retorted, "and often listening on the DX bands I suspect that there are a lot of them."

We had to think that over a bit, but we could remember getting technical advice on some trips to local radio boutiques. There was one afternoon when W6PHF had taken us on a walking tour of the amateur receivers, transmitters, and transceivers, recounting the merits or pitfalls of each and commenting on the designs used in the gear. Possibly it was about then when we decided that better than a BS degree might be a knowledgeable friend in the trade.

But we were well aware that the Old Timer had never been reluctant to hold up a new idea and look it in the eye, and that during the summer months he had been trying to decide whether the computer he acquired was smarter than he was or just a digital delinquent out to harass an Old Timer. We asked about it and got a smile.

"I suspect that we have reached an unspoken understanding," he told us finally. "The computer agrees to behave if I take the time to read the instructions and the operating guides before I turn on the programs. Reading everything from the first page does help, and adding a second drive helped even more. You would be surprised to see the amateur programs available. There are some good ones for DXers. It is informative to run the Super DX Edge™ and note the sunrise/sunset shadow line. With these short days and the cycle rising, it is a big help on the lower bands. N2UN must be a DXer because he seems to know what DXers need."

The Old Timer paused to lean closer, maybe even a bit of the holiday twinkle in his eyes. "It does save a lot of thinking," he suggested. "Maybe that should interest you."

What could we say? Here was a DXer who at the bottom of the last cycle had been complaining that he was concerned about finding the time to read all the interesting books on all the interesting subjects. Now he was telling us that we might save ourselves the burden of thinking. Next he would be telling us how to save and improve our DXing time. We glowered to ourselves before speaking. Then we realized that might be just what he was sug-

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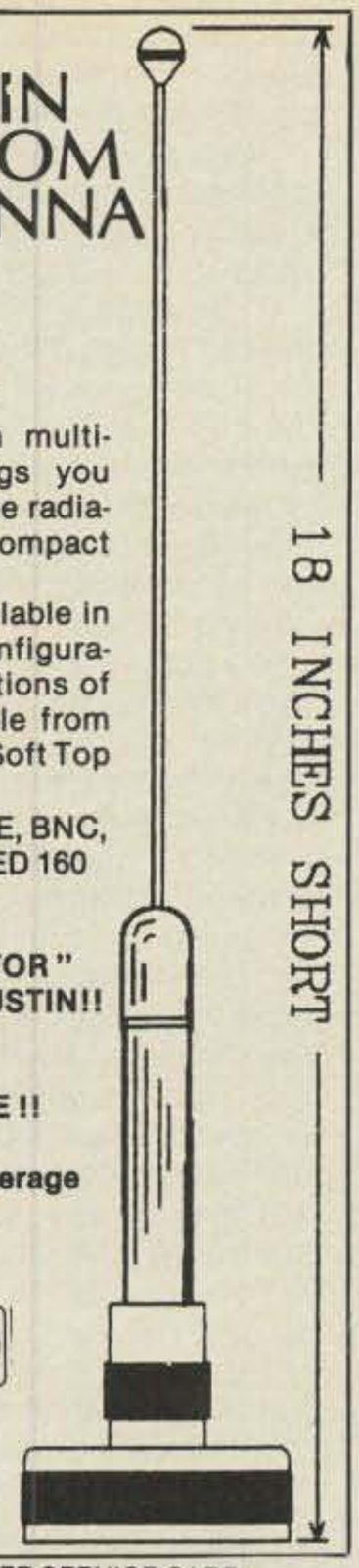

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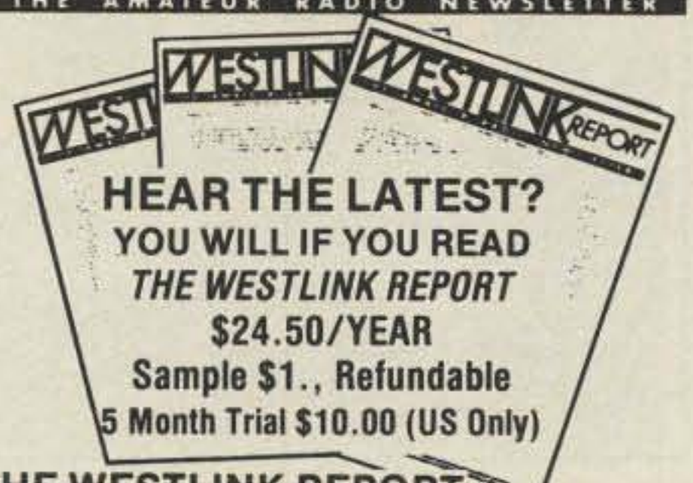

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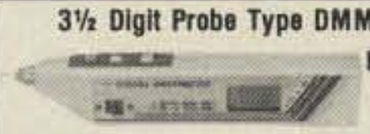

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237 ..... KA7NOC

Endorsements

Mixed: 450 SM5DUT, HG9R, W8GBH, KA2AOT, KS3L, NF9V. 500 SM5DUT, HG9R, KA2AOT, KS3L, NF9V. 550 SM5DUT, TF5BW, NF9V. 600 SM5DUT, K8UNP, TF5BW, NF9V. 650 SM5DUT, K8UNP, NF9V. 700 K8UNP, NF9V. 750 K8UNP, KC7EM. 800 K8UNP, AA4LB, W9IAL. 1050 KI3L, W9IL. 1100 KI3L, W9IL. 1250 NN4Q. 1300 NN4Q, I1EEW. 1350 NN4Q. 1450 K2POF. 1500 K2POF. 1700 WA4QMQ. 1750 KF2O. 1800 KF2O. 1900 IN3ANE. 2150 N9AF. 2200 N9AF. 2250 N9AF.

S.S.B.: 350 I2WZX, YU2NA, IK7BPV. 400 IW2ZX, YU2NA, IK7BPV. 450 I2WZX, YU2NA, IK7BPV, W8HFK. 500 I2WZX, YU2NA, IK7BPV, W8HFK. 550 I2WZX, YU2NA, W8HFK. 600 I2WZX, YU2NA, TF5BW, W8HFK, KC7EM. 650 I2WZX. 700 I2WZX. 750 I2WZX, IK8GCS. 800 I2WZX, I3ZSX, K2POF. 850 I2WZX, K2POF. 900 I2WZX, IN3QCI. 950 I2WZX, IN3QCI. 1250 I1EEW. 1450 KF2O. 1500 KF2O. 1550 KF2O. 1600 WA4QMQ. 1700 NJ@C. 2100 WD8MGQ. 2500 K2POZ. 2650 ZL3NS. 2700 ZL3NS.

CW: 350 SM5DUT, I1EEW, W8GBH, WA6HYB, I1WNB, DF3QN. 400 SM5DUT, DF3QN. 450 KS3F, SM5DUT, DF3QN. 500 SM5DUT, JG2LGM, DF3QN, KS3F. 550 SM5DUT, DF3QN. 600 SM5DUT, DF3QN. 650 DF3QN. 700 DF3QN. 750 DF3QN. 800 G4SSH, DF3QN. 850 NF5Z, VE4CE. 950 VE4CE. 1150 KF2O. 1200 KF2O. 1250 I1EEW, VE1MF. 1300 VE1MF.

10 Meters:	WB4FOT, JR7JTP, HK6BER
15 Meters:	WB4FOT, K8ZZU, YU3NA, HK6BER
20 Meters:	WB4FOT, W9IAL, K8ZZU, YU3NU, HK6BER
40 Meters:	YU3NU, KC7EM, HK6BER
80 Meters:	K8ZZU, KC7EM, HK6BER
160 Meters:	HK6BER

Asia:	YU2NA, KS6UW, JR7JTP, K8ZZU, W6LC, VE4CE
Africa:	K8ZZU
No. America:	I3ZSX, K8ZZU, YU3NU
So. America:	KE6KT
Europe:	W9EAL, YU2NA, K8ZZU, WA4WIN
Oceania:	IK8GCS, K8ZZU, WA4WIN

Award of Excellence Plaque Holders: CT1FL, W8RSW, WA4QMQ, W8ILC, VE7DP, K9BG, W1BWS, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SM@DJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, K6JG, N4MM, I8YRK, W4CRW, SM@AJU, K5UR, K6XP, N5TV, K2VV, VE3XN, W6OUL, DL1MD, DJ7CX, DL3RK, WB4SIJ, SM6DHU, N4KE, I2UIY, DL7AA, ON4QX, WA8YTM, YU2DX, OK3EA, I4EAT, OK1MP, N4NO, ZL3GQ, VK9NS, DE@DXM, DK4SY, UR2**, AB9O, FM5WD, I2DMK, W4BQY, I@JX, SM6CST, VE1NG, I1JQJ, WA1JMP, PY2DBU, HI8LC, KA5W, K@JN, W4VQ, KF2O, K3UA, HA8UB, W8CNL, K7LJ, W1JR, F9RM, W5UR.

Award of Excellence Plaque Holders with 160 Meter Endorsement: K5UR, OK1MP, N5TV, W8CNL, W1JR, W6OUL, W4BQY, W5UR, N4NO, W8RSW, N4KE, I2UIY, W8ILC, W1BWS, NN4Q, G4GUE, LU3YL/W4, I4EAT, VE7WJ, W9NUF, N4NX, VK9NS, DE@DXM, VE7IG, K9BG, AB9O, FM5WD, SM@DJZ, DK5AD, SM6CST, I1JQJ, W3ARK, HI8LC, KA5W, UR2**, VE3XN, K6XP, LA7JO, W4VQ, K6JG, K3UA, HA8UB, W4CRW, N4MM, K7LJ, SM@AJU, KF2O.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if air-mail desired) to CQ WPX Awards, P.O. Box 1351, Torrance, CA 90505-0351 U.S.A.

One thing a DXer learns is to recognize call signs. But first, do you recognize the faces in the photo? A clue: they are all DXers! On the left is Thore Winsnes, LA5DQ/3Y5DQ. In the center is Martti Laine, OH2BH, plus a lot of other calls. On the right is John Snuggerud, LA1VC/3Y1VC. (LA8CJ photo)

gesting—saving time for DXing. After we thought a bit, the Christmas bells again were jingling.

Eventually the Old Timer rose to leave. "Let's save some for another day," he suggested. "And don't look for me for a couple of weeks. I will be gone for awhile." This was something unexpected. Like most dedicated DXers, the Old Timer did not like to be far from his rig—not too far and for not too long.

"Something up?" we inquired, possibly a bit anxiously. We just had to know what might be changing an established routine. When one accumulates a reasonable layer of the years, one learns to note quickly some signals that arise, especially the unexpected ones. The Old Timer shook his head.

"No," he said. "Just thought I would take a couple of weeks and visit some of the old DX friends from across the years. Maybe Pete and Jessie down in Arroyo Grande and Frank in Simi Valley." Then the Old timer fixed an eye on us and continued.

"I plan to spend the holidays with the Palos Verde Sundancers." That was all he said, and it was hardly enough. Long ago we learned that when one visits the barrancas where the Sundancers dwell, one comes not as a spectator but as a participant—even Old Timer DXers.

"Don't you think you might be overdoing things a bit?" we asked, thinking of the vigorous holiday routines that the Palos Verdes Sundancers lover. We could see the Sundancer's Leader soaring in a *grand jete*, and we had to wonder how the Old Timer would manage. He would even have trouble with *tour en l'air*! We just had to ask questions.

"We will see," was all the Old Timer would say. Perhaps our expression showed it was not enough of a reply. Then he spoke again. "Lately I have found that my knees tend to stiffen when I spend too many hours at the operating desk. The DXing is always fun but it is becoming more and more difficult to leave it when the knees don't want to bend. I was thinking that a spell away from DXing and some refresher courses with the Sundancers might get me in shape by spring. What do you think?"

We had come around to thinking that it might be a good idea. We could appreciate the problem but could not resist paying off some of the due bills. "Sounds good to us," we said, "and possibly it will help you a bit. Getting along in years, aren't you?" we added maliciously. But the Old Timer only smiled.

"Everyone does," he answered us. "Every DXer gets older. But make sure that it is your knees and not your thinking that shows it." And with that he was gone.

It has been a continuing pleasure to have the Old Timer up the hill from us and to enjoy his stopping to visit when he is heading down the hill. The Old Timer walks to the village whenever it is feasible. We thought again of his conversation, and realized again, as we have often done in the past, that we tend to hear more in his words after he has gone than when he is here.

We got to thinking of all DXers growing old. Even the younger ones are adding a daily increment of time to their totals. We wondered again why the signs of the years are often more apparent in those never initiated into the DX world than with DXers. We have often thought of the older DXers. Some were old DXers when we joined the local DX club more than a quarter century back, and these never seem to grow older, not in their appearance and not in their thinking. Maybe they are not spending their holidays with the Palos Verdes Sundancers, but they are definitely still the participants and not yet spectators. And we doubt that they will ever be spectators. DX seems to have been good for them.

Possibly you have noted some of these same things. And if you are bothered by a twinge in the knee, remember that the Palos Verdes Sundancers have a remedy just for you. Something they call a *fouette en tournant*. You might want to try it.

Rotuma

In September K3NA petitioned the DXAC for country status for Rotuma, an island in the northern reaches of Fiji territory. The petition was accompanied by a request for a quick answer, as it was intended to put the island on the air for two weeks from October 22nd to November 5th. This was aimed at the *CQ* World-Wide Phone Test the last weekend in October, among other things.

The DXCC country status was based on Point 2a, the island being 285 miles distant from Kia, an island north of Vanua Levu in the "parent" Fiji island group. Apparently there was a previous application for DXCC status for Rotuma back in 1982, and this one was based on the autonomous status of the island. The current one is based solely on distance. Why this was not cited in the previous application is not known.

Section 2a of the country criteria states: "2a SEPARATION BY WATER: The islands or islands situated off shore, geographically separated by a minimum of open water from a continent, another island or group of islands that make up any part of the 'parent' DXCC country."

Anyhow, if you heard commotion on a new one out in the Pacific, this might help understand what was going on. If it has not materialized, it might not have received the imprimatur from the DXAC. There might have been some other problems developing. Those planning for this possible new one were Eric Scace, K3NA; Ed DeYoung, 3D2XX; Kip Edwards, W6SZN; and Tony Zimmer, KN3T. The Northern California DX Foundation is assisting in the planned effort.

Okino-Torishima

While we are talking of islands, most DXers

Say You Saw It In CQ

The WAZ Program

20 Meter Phone

689 ..... NT5C

40 Meter Phone

46 ..... I0WDX

15 Meter CW

130 ..... VE7AHA

20 Meter CW

307 ..... AA4DO

All Band WAZ

SSB

3221	W4OUE	3226	W5HTY
3222	JA6GWX	3227	I0MOM
3223	W6KZW	3228	JJ4GNE
3224	JH2SON	3229	KN2N
3225	WB5NXH		

Phone/CW

6377	K8UNP	6381	WA8JOC
6378	YU3HR	6382	AA2X
6379	KB2XR	6383	G3RZP
6380	K9ZXG	6384	KA6CJL

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (39 cents) size 4½ × 9½ to the W A Z Manager, Leo Haijsman, W4KA, 1044 S.E. 43 Street, Cape Coral, Florida 33904. Applicants forwarding QSL cards either direct to the WAZ manager or to a check point should include sufficient postage for safe return of their QSL cards. The processing fee for all C.Q. awards is $4.00 for subscribers and $10 for non-subscribers. In order to qualify for the subscriber rate, please enclose your latest *CQ* mailing label with your application.

are aware that this one, which first showed in May 1976 and vanished from the DXCC country list in November 1980, has been up for a second recognition. If you wonder what previously happened, back in 1976 the Japanese Amateur Radio League (JARL) was celebrating its 50th anniversary and the thought arose that it would be nice to have a new country to mark the occasion. With none readily available, it was thought that the rules would be bent a bit, the DXCC Country criteria being the rules involved, and on schedule Okino-Torishima would be heard to mark the Golden Jubilee of the JARL. It was quickly proven that you can never figure which way a DXer will jump. It did seem that more were protesting the decision than were looking forward to a new one.

Just in case you are not acquainted with the island, it is more reef than island, only two rocks being awash and visible at low tide, while everything is submerged at high tide. Years back the Japanese started to build a weather station there. The U.S. Hydrographic Office's *Coast Pilot* reported that a helicopter survey of the locale made in 1959 showed a submerged structure about 40 feet in diameter and constructed of quarried or concrete blocks. This structure was barely awash at low tide.

In May 1976 the JAs did make the effort, erecting the familiar tubular building scaffolding on the reef, one scaffold for the power plant and the other for the operating position. At high tide the structures appeared to stick up out of the ocean. The Northern California DX Foundation has VHS videos of the 1976, 1978, and 1979 efforts from the reef. Some are quite startling when you see footage shot with an underwater camera showing the legs of the platforms under water with fish swimming right through the new country.

This is Mr. Zhou, the operator at BY4AA, while on the recent Mt. Everest effort. Here at a staging point at Potala in Tibet, DXers recognize the most prominent building in the former AC4-land. All of this again proves that DXers are everywhere. (N6AW photo)

Earlier this year the Japanese parliament voted to spend a quarter billion dollars to save Okino-Torishima from being washed away by the sea. The two small rocks are being eroded by ocean waves. The plan is to encase the rocks in a large steel and concrete structure, a job which may take up to three years. The area is a center of heavy storms, often referred to as "Typhoon Ginza," and these can send water as high as 60 feet over the two small rocks, these lying almost a mile apart. Things are not much better below the water with the rocks supported by spindly columns which might collapse in the storms. Two circular blocks, each 160 feet in diameter, will be erected and are designed to create an artificial land which will be at least 3 feet above the water at all times.

Why all the interest in a couple of half-submerged rocks? The Law of the Sea treaty, while never approved but still observed by most maritime nations, provides for an exclusive fishing and mineral rights zone for 200 miles around an island or offshore from a mainland. If the rocks at Okino-Torishima go, the Japanese claim to 163,000 square miles of ocean goes, and the coastline of Japan shrinks back about 200 miles to the area of Minami Iwo Jima some 400 miles to the north or to Oki Daitojima about the same distance northwest of Okino-Torishima. Unless the two rocks are protected, it is believed that within a few years they will disappear under the sea.

When trying to explain the concept of the DXCC to the uninitiated, there are times when a DXer encounters a touch of incredulity as to what constitutes a country. It does take a bit of understanding and study, but perhaps we are not alone. When a claim can be made to 163,000 square miles of ocean with all the fishing rights and undersea mineral resources because of two rocks sticking out of the water, then understanding a DXCC country should come easily. Maybe it is just again the case of DXers being way ahead in their thinking. Then again, it might be something else.

SM7PKK/Pacific

Mats Persson, SM7PKK, being 21 years old and in his right mind, is spending the Swedish winter in the South Pacific watching the sun sparkle on the waves and working DX from a number of stops.

Mats was in Hawaii in September, went south to Western Samoa in late September, and has been working 5W1 plus KH8, American Somoa. He was in ZK2-Niue in early November. During the middle of November it will be A3-Tonga and then on to Fiji where he will sign 3D2KK.

After Fiji Mats will go to Australia for some months, showing up next spring in the South Cooks about March 25th for a two-week stay. First licensed when 17 years old, SM7PKK likes CW, getting the lowest grade of the Swedish license and then advancing to the top CW level within a year. He plans to be 5 kHz from the bottom of the bands, 80–10 meters for CW, and at 3795, 7095, 14195, 21295, and 28005 kHz for SSB. Forty is the favorite band, and he may be using SM0AGD's channel system on SSB, so listen for instructions.

QSLs will be handled by different people back in Sweden. Thus, it will not be feasible to mix the various operations. Send them to: Mats Persson, Betsev.22, S-240-10 Dalby, Sweden (SASE or SAE/IRC needed).

Montserrat

Montserrat and Antigua will be put on the air by a Texas DX group, most of the action being at VP2M over the *CQ* World-Wide CW Test the last weekend in November, with the flexing of muscles and the needed warm-ups starting on November 23rd in Montserrat. The effort will run a couple of days beyond the CW test, November 29th being the date they go QRT. On November 22nd the group will be in Antigua, and they hope to get a special license for a one-day CW effort.

Ron Marra, AA5DX, Bill Carter, KM5R, and Alan Benoit, WQ5W, will be the operators. Before and after the DX test they will sign their own calls /VP2M and will give special attention to the low-frequency bands, including 160 as much as possible. QSL VP2MW to KM5R. The

5 Band WAZ

As of September 1, 1988 189 stations have attained the 200 zone level.

New recipients of 5 Band WAZ with all 200 Zones worked:

SM7BYP
G4LJF

The top 8 contenders for 5 Band WAZ are:

1. N4WW, 199
2. W8UVZ, 199
3. K6YRA, 199
4. K9GX, 199
5. SP6JCY, 199
6. W2YY, 198
7. W7UR, 198
8. KB0U, 198

496 Stations have attained the 150 Zone level.

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What do Lancastershire DXers do when they work a new one in the Pacific? From miles around they rush to celebrate. During the Kingman/Palmyra effort earlier this year G3UJE worked the effort for a 300 marker. Bonfires were built on the hilltops and DXers rushed to celebrate a tough one. From the left are Barry, GW4RHW; Phil, G4OBK; Tom, G4STZ; Ian, G4YSN; John, G4WXO; and the cause for the celebrating, Brian, G3UJE. G4OBK was the RSGB HF Contest winner 1984–86.

other calls go directly to the Callbook address of the operator. SASE/SAE/IRC requested.

Zone 2

Kent Chown, VE2LJ, will put Zone 2 on the air during the *CQ* World-Wide CW Test the last weekend in November. This will be a single op, single band operation and 15 meters will be the band.

The operation will also count for IOTA NA 84, so the rewards will be great for working Kent in the contest. A counter, a zone, and an IOTA. The good, maybe great, days of DXing are at hand. Prepare!

DX Awards Directory

Ted Melinosky, K1BV, notes that it is not unusual to find awards specifying that only contacts made within a certain year are valid for the award. Examples of such awards are the Seoul Olympics Award and the RSGB 75th Anniversary Award. By mid-summer Ted had identified 15 such awards with possibly more to turn up by the end of the year. If you thirst for awards and fear to let any possible ones get by you, send an SASE to K1BV at 525 Foster Street, South Windsor, Connecticut 06074, and he will send back a copy of his alert list (SAE and one IRC for overseas). You might be surprised at what you will learn.

St. Vincents

Looking ahead, it might be time to think of spring and an early escape from winter. Next mid-February, Bill O'Kain will be taking a group of DXers down to sunny St. Vincents to warm up with some J8 activity. Others going will be WE5P, N4FKO, K4PJ, KB5CBW, W5PWG, and K4LTA. The effort will be across the ARRL CW and SSB DX tests. It is expected that the call J8DX will be issued for the group's contest operation. Again the group will make a special effort to listen for the JAs and the needy European DXers. All bands will be used, including 160.

This same group was out earlier this year over the contest weekends and made over 20,000 QSOs with their own calls from J34 Grenada and some 4500 with a J34A contest call. Interesting perhaps is the activity of W5PWG on the WARC bands, David doing the following:

10.1 MHz CW, 232 contacts in 20 countries
18.0 MHz CW, 152 contacts in 25 countries
18.1 MHz SSB, 5 contacts in 4 countries
24.9 MHz CW, 97 contacts in 16 countries
24.9 MHz SSB, 163 contacts in 13 countries.

J34WG was the call sign used in the WARC bands. This year from St. Vincents there will be another tilling of the new frequencies. Check the QSL Information section for a list of the calls used and the QSL card routes.

W6AM Museum

Jan Perkins, N6AW, has been designated as the trustee for W6AM, Don Wallace's call, this being done by the members of Don's family.

The WPX HONOR ROLL

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with CQ master prefix list. Scores are based on the current prefix total regardless of an operator's all-time count. Honor Roll must be up-dated annually by addition to, or to confirm present total. If no up-date, file will be placed into "inactive" until next up-date. Lifetime Honor Roll fee $2.00 (U.S.) for each mode, with no fees required for up-dates.

MIXED

3403	YU2AA	2082	N2AC	1602	YU2NA	1273	N8BJQ	986	G4SDJ
3400	F9RM	2077	YU1AB	1565	N6JM	1272	N2CIC	958	W0JIE
3103	K2VV	2056	PA0SNG	1555	K8LJG	1269	K2OLG	944	G4OBK
2946	W2NC	2047	W1NG	1553	SM6DHU	1227	WB8ZRL	883	I2EAY
2754	VE3XN	2019	YT7DX	1549	IT9QDS	1203	YU1GR	872	W2XQ
2750	K6JG	2014	I6SF	1549	KL7AF	1195	JA6GWU	869	I5ZTC
2659	YU2TW	1973	N6CW	1527	K2POF	1188	K7CU	835	OE1KJW
2531	W4BQY	1865	IN3ANE	1470	NN4Q	1172	KC8CC	820	K1BAZ/DV1
2521	N4NO	1842	W0SFU	1467	DK5AD	1161	YT7WW	787	W9IAL
2502	K6XP	1828	4X4FU	1458	W8UMR	1153	N2AIF	774	YU1PJ
2416	W9DWQ	1825	YU7SF	1441	W6OUL	1146	AI6Z	773	YU3PG
2369	N6JV	1817	K9BG	1436	I1POR	1138	DF6EX	750	F1HWB
2355	N4MM	1802	KF2O	1414	SM0AJU	1102	VE5FX	750	KI8B
2256	I2PJA	1799	CT1LN	1373	YU2CQ	1101	W9IL	750	KC7EM
2211	N9AF	1797	HA0DU	1352	SM6CST	1096	HA8XX	747	YU7RU
2211	WA8YTM	1736	IS0LYN	1351	I1EEW	1094	PY2DBU	729	W4WKQ
2159	YU7BPQ	1736	I2MQP	1350	AC2J	1076	I0AOF	719	KY3V
2135	EA2IA	1703	N5TV	1340	KA5W	1066	NE6I	715	K6UXO
2131	I8YRK	1701	I2UIY	1333	W4UW	1050	KS0Z	697	N3KR
2128	N6CW	1699	YT3AA	1329	W7CB	1031	YU7DR	648	IK2BHX
2111	PY1APS	1694	SM3EVR	1309	YU2TY	1000	NV9S	641	JE2GMO
2103	SM7TV	1631	N6AW	1278	EA2LF	998	SP5AA	600	RB5MP

SSB

3326	F9RM	1744	I2MQP	1305	I8KCI	1067	I2TZK	799	NK2H
2964	I0ZV	1717	I8YZP	1305	EA3AQC	1050	F6BVB	797	KC2FC
2659	K2VV	1682	NJ0C	1272	W2NC	1034	W0ULU	790	K9BQL
2576	ZL3NS	1656	I4CSP	1257	KK0L	1029	KA5W	781	IK2DUU
2457	K6JG	1651	CT1LN	1251	KL7AF	1020	I8WYD	766	I0PSB
2452	K2POA	1632	NJ0C	1249	EA8AKN	1010	K8LJG	750	F1HWB
2354	CT1UA	1583	WA4QMQ	1248	YU2NA	997	HA8XX	747	AI6Z
2268	K6XP	1569	EA2IA	1241	I1EEW	983	G4SDJ	731	W5ILR
2253	I2PJA	1538	ZP5JCY	1213	K5RPC	972	WA2FKF	729	IK8GCS
2238	I0AMU	1533	W1NG	1207	I1POR	958	KD9OT	726	NE6I
2140	W0YDB	1529	KF2O	1178	CT1BY	948	KE6KT	713	IT9JKY
2124	N4MM	1516	W3ARK	1166	N6FX	938	PY4OY	712	VO1AW
2101	WD8MGQ	1451	G4CHP	1162	NN4Q	904	YB3CEV	698	I7UNX
2064	VE1YX	1450	G4CPJ	1156	AB9O	885	W6OUL	678	KB4HU
2007	I4ZSQ	1415	KC8YM	1155	N2CIC	877	KB0C	674	G4MVA
2005	CT4NH	1397	I2UIY	1144	IK5ACO	860	K8ZZU	648	N6CGB
1933	W4BQY	1393	AC2J	1141	KC8CC	859	KK5P	647	DK0AF
1915	N4NO	1387	XE1OX	1129	N2AC	857	CT1AHU	631	YV1CP
1906	OZ5EV	1375	N5TV	1110	EA4KK	848	K3IXD	622	SM6CST
1861	I8YRK	1375	I5ZJK	1100	PY4VX	831	I3ZSX	618	CT1DIZ
1801	PA0SNG	1340	CT4UW	1097	SM0AJU	825	LU1VK	613	NM5Y
1762	WA8YTM	1338	W4UW	1091	I2EOW	803	G4KHF	611	HR1FC
1750	W9DWQ								

CW

2688	W2NC	1729	LZ1XL	1154	KL7AF	1017	HA5LZ	753	I2EAY
2565	K2VV	1709	EA2IA	1142	F6HKD	1010	KN7K	743	NE6I
2356	WA2HZR	1622	I1YRL	1138	I2UIY	1008	YU2CQ	715	W2XQ
2347	N6JV	1613	N4MM	1137	EA7OH	1005	TI4SU	711	JA2GCW
2199	N4NO	1605	VO1AW	1117	I7PXV	999	YU2NA	709	W0JIE
2193	ON4QX	1595	4X4FU	1114	W1WAI	975	KA5W	707	WB8ZRL
2103	VE7CNE	1595	WA8YTM	1099	AK2H	969	G4FAM	705	KA1CLV
2051	K6JG	1519	PY4OD	1090	W9PWM	967	SM5DAC	670	K1BAZ/DV1
2029	W3ARK	1400	N5TV	1082	K8LJG	943	I8YRK	667	YU3PG
2014	W9DWQ	1398	I2DMK	1074	VE1ACK	920	AI6Z	659	AC5K
1968	W4BQY	1379	KA7T	1056	YU3NU	849	CT1LN	651	G4UOL
1958	G2GM	1358	IT9VDQ	1052	DJ1YH	821	G3VQO	649	HA8XX
1927	K6XP	1292	W1NG	1038	SM0AJU	821	KQ3S	639	KU0S
1851	N2AC	1252	N6FX	1034	I2IWM	806	OZ5UR	622	LZ2VP
1836	YU7SF	1223	SM6CST	1025	LA9XG	802	G4SSH	609	IS0FIC
1779	OZ5EV	1220	K2POF	1024	NN4Q	763	OE1KJW	605	K7DBV
1762	I6SF	1188	KF2O	1018	W6OUL				

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29th ANNUAL

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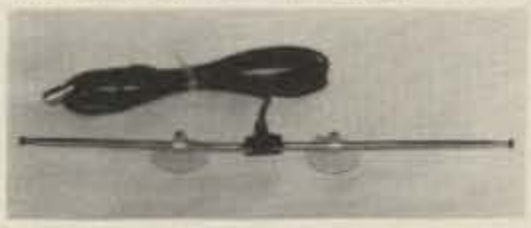

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CQ DX Awards Program

SSB

1623	OA4AAW	1628	NT9V
1624	WA7QJZ	1629	WB7UUE
1625	JY5EC	1630	JF1KBL
1626	W0FF	1631	N6AHV
1627	LU1JDL	1632	IK8BMW

CW

732	K2TQC

SSB Endorsements

310	OZ3SK/319	275	KS0Z/297
310	ZS6LW/318	275	KI3L/295
310	PY1APS/318	275	VE3DLR/294
310	K8PYD/316	275	XE1MDX/295
310	PY2DBU/315	275	KC2FC/290
310	SM4CTT/314	275	N9CPW/286
310	AI8S/311	275	KB7VD/277
310	KB8DB/311	275	WD0DMN/277
310	KZ2P/311	275	W0FF/275
310	N6AHV/310	250	KB1JU/272
310	NY5L/310	200	KI4FW/200
300	KA9ABC/307	200	WB4FOT/200
300	K3LUE/306	200	WA4WIN/200
300	W4UW/301	150	IK8BMW/184
300	W4BQY/301	28 MHz	KE4VU

CW Endorsements

310	ON4QX/318	300	EA2IA/308
310	DL1PM/316	300	W6SN/304
310	W4BQY/315	275	N8MC/295
310	K2TQC/315	275	K2OWE/292
310	K8PYD/310	275	DJ2PJ/276

Total number of active countries is 319. The basic award fee for subscribers to CQ is $4. For non-subscribers, it is $10. In order to qualify for the reduced subscriber rate, please enclose your latest CQ mailing label with your application. Endorsement stickers are $1.00. Updates not involving the issuance of a sticker are made free when an s.a.s.e. is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for air-mail reply. Please make all checks payable to the awards manager.

Don Wallace was a charter member of the Southern California DX Club, maintaining an uninterrupted membership for 40 years.

Work continues on the establishment of W6AM museum to the north of Los Angeles, and N6AW still seeks to obtain any early amateur radio memorabilia and especially anything that is tied to W6AM's long activity in DX.

Jan has a new address. A traumatic experience for any DXer is to have to move. The current address for Jan is 11942 Bos Street, Cerritos, California 90701.

The 1989 International DX Convention

The convention will again be at the Grosvenor Holiday Inn in Visalia, California from April 21–23. The Northern California DX Club will be the host for the 1989 gathering. Write to W6TPH, Bill Zachman, should you need additional information.

Some DX Notes

Pete Hoover, W6ZH, was active from Lord Howe and Norfolk Islands during October. Check your *QST* file about a quarter century back and you will see the same call sign as the president of the ARRL. Not the same person, it's the son who is active in Red Cross work. Herbert Hoover, Jr. was W6ZH, ARRL president. Herbert Hoover III now holds the call. Pete was using a VK6-/VK9 call sign but was hoping for some local calls to be issued.

The ARRL is accepting C9MKT QSLs. Apparently the station is allowed to operate only a few days a month, these usually being the third weekend of the month, the weekends starting on Friday. Anyhow, watch at around 1900Z at 14300 or 21290 kHz, up or down a bit. The QSL Manager for VR6ID keeps a schedule, sometimes early in the week, sometimes later, sometimes on weekends. Monday or Tuesdays watch around 21305 kHz at about 1700Z. Tune around if there is nothing right on that frequency. Thursday and Fridays same frequency same time is sometimes productive. The station is reported on Sundays on 10 meters at 1700Z at 28490 and at 7163 kHz at 0600Z sometimes.

KH6JEB may be heard from Kure in late November, possibly into the early days of December. Keep in mind that it is summer now in the southern hemisphere and the annual resupply trips are being made to both the Antarctic and the off-shore islands in the Southern Ocean. VP8BRR is reported from South Georgia often on 15, sometimes up around 21355 kHz or so, sometimes down around 21300 kHz and from 1700Z. From the South Orkneys there have been reports that LU5EAS/Z shows frequently after 1930Z and around 21215 kHz.

TA2/N4EXR is sensitive to the needs of the Deserving DXer and shows most days around 14230 kHz around 0300Z and sometimes at 21205 kHz after 2000Z. If you like CW, try listening for Glenn around 14013 after 0345Z. QSL to Box 384, Izmir, Turkey. VK0IC will be active from Mawson Base into January, Ted being there to do maintenance work on the commercial gear at the Australian outpost. He can be found around 14020 kHz, plus or minus one or two, from 1600Z or a bit later. 5Z4DU shows rather regularly around 21345 kHz after 1930Z and keeps a handful of schedules with 4-landers.

OZ9EDR was on for the SSB World-Wide Test, this one operating 160 SSB for which special authorization was given by the Danish government. The group had 10 operators and worked everything 10–160.

The Long Island DX Association has a crew of new drivers. Jules Freundlich, W2JGR, is the president. Leonard Zuckerman, KB2HK, is the vice-president. Ed Whitman, K2MFY, handles most of the club chores as secretary. Virginia Chittenden, WA2BGE, watches the club's treasury, and John Reiser, KB2CB, is the corresponding secretary.

ZL5BA is a Greenpeace amateur station at Scott Base in the Antarctic, the only nongovernmental station currently active on the continent. Sojo, the operator, favors SSB but also has been heard on AMTOR and via the satellites. QSLs go to KB4GID, SASE needed. Sojo favors 20 and 40 meters. Watch for PJ1B on all bands during the *CQ* WW Phone Test.

"The Southern California DX Club Bulletin," and that's its full name, runs up the warning flag on the proposed revisions to FCC Part 97. The club advises, especially if you have a tower, you to read the July *QST* editorial and to keep posted on the matter. Jerry Hagen, N6AV, is beating the bongos for 10 meters, Jerry noting that during the WPX tests there was a lot of DX found on 10 and things have improved even more since then. A prediction is made that Cycle 22 will be better than Cycles 19, 20, and 21.

HB0CZS was a multi-multi effort from Liechtenstein during the *CQ* WW SSB Test. Recently the IARU voted the Amateurfunk Vere in Liechtenstein into membership as the 125th member. Claus Floesser, DL2GBT, was on from Malta for a spell running up to mid-October. Claus signed 9H3EH, and the QSL route is in this month's listings.

Every June 6th for many years French amateurs from the St. Lo area put a special call station on the air to mark the D-Day landings in 1944. Actually, they operate with the special call for two weeks, this year from May 28th to June 13th. This year they made 3400 QSOs (1900 SSB, 1500 CW), all the WAC continents, and 29 WAZ Zones and 85 countries for DXCC. They might even have a WAS. Look for a special call station next June. This year they signed TQ6JUN, and they operated from Normandy at Utah Beach. All this may be difficult to remember, but some DXers have no problem. There were Omaha, Utah, Sword, Juno, and Gold Beaches with St. Lo the objective of the forces coming in over Omaha Beach. For certain, the people of St. Lo remember June 6, 1944 and the St. Lo breakout a couple of months later.

JH1LKH and JA2NQG were on Lord Howe signing VK9LS in September and then headed for Norfolk. Earlier this year they were on Guam, visited in New Zealand, and then headed out for their DX chores. Cat Island, in the

5 Band WAZ No. 67

The first DXer from South Africa to win the coveted WAZ Award, A. Lausecker, ZS5LB, lives in Vryheid. Sixty-six years old, he was first licensed as OE5LBL and holds the top ZS amateur license. They only have one class. He is a radio and TV technician and is married with three children.

A. Lausecker, ZS5LB, was the first ZS to win the 5 Band WAZ plaque, the first on the African continent, and only EA8AK in the Canary Islands got ahead in the area. Licensed as OE5LBL in 1964, ZS5LB likes CW best.

ZS5LB belongs to the Pietermaritzburg Radio Club, but that's 200 miles down the pike. He holds 5BDXCC, 5BWAS, and a WAC on 160. The station gear is all Kenwood. He has a 3-element Mosley antenna and a longwire.

Forty meters was the hardest one to fill out. It took two years to catch a good zone 40 on 40 meters. On that 5BDXCC and 5BWAS, ZS5LB was also the first ZS to corner these. He works mostly CW and does not frequent the DX nets. He just spends his time looking out for his needed ones.

The only other 5BWAZ in Africa was EA8AK in the Canary Islands. ZS5LB is the first on the continent.

Say You Saw It In CQ

vicinity of Ship Island, offshore in the Gulf of Mexico from Biloxi, was on the air for IOTA catchers in late October, this to give IOTA #85 to the needy IOTAers. WB5PPG, N5FG, and WN5IJZ, plus K5MK, were the operators. Larry, K5MK, handles the QSLing.

KP2A will be heard in the *CQ* WW CW Test. Work them on five bands and you will get a certificate. Work them on six bands and zowie! You get the super certificate. The QSL route is via N6CW.

Father Moran has been in the States. He was on the West Coast in early September and then worked his way across country—figuratively, that is. 9N1MM is one of the living legends of DXing and the hope across the years for many DXers seeking Nepal. In early October he was at the Southeastern Michigan DX Club meeting. He was also due at the DXPO at Falls Church, Virginia.

Speaking of the SEMDXA, Wayne Wiltse, K8BTH, is the new president, Stan Arnett, AC8W, the V.P., and George Bloomfield, N8FGH, secretary. Rick Dorsch, NE8Z, moved from QSLs to Programs and Maurice Schietecatte, N8CEO, is the treasurer. HSØA and HSØB have restricted operating times but often show in the major contests. After 1100Z is a good time to watch, and they do seem to favor the areas around 14190 kHz and 21300 kHz. VP8BRT is with the British Antarctic Survey and is reported to be in the South Orkneys on Signy Island. He is also reported to be there until June. He is being found on 15 somewhere between 21250 and 21300 kHz and after 1800Z.

The Carolina DX Association's bulletin "The Pileup" reports that you will find KDØJL running a 40 meter SSB DX Net at 7163 weekdays or 7158 kHz on weekends, all the action starting at about 0530Z, often running to around 0800Z, these times escaping much of the BCI. The "Balanced Modulator" of the North Florida Amateur Radio Society reports that four amateur satellites, these only 9 inches square, are being constructed in Boulder, Colorado and are to be launched in the summer of 1989. These satellites are intented to store and forward packet radio communications.

On that new DXCC country, Rotuma, there may be more information out by the time you read this, but apparently it all stems from an interpretation of the new country criteria adopted at the January 1988 ARRL Board meeting. The point being made is that the current Point 2 refers to islands "... islands not having their own government." Proponents of the new country make the point that 2b does not apply to DXCC countries covered by Rule 1's "government" and that 2a applies. You look it up. It might help you keep your attention on the matter if you know that if this one flies, there are ten or twelve more out in the Pacific that are being eyed for the future.

73, Cass, WA6AUD

QSL Information

Dennis Wheeler, NW2J, in downtown Castleton, New York, is a volunteer for the noblest of undertakings. Dennis offers his services as a QSL manager for a DX station. Contact NW2J, 1529 Sunset Road, Castleton, NY 12033. Another worthy one ready for the challenge is Donald Lehto, WA7WOC. Already the QSL Manager for 4X6VV from April 1988, Donald wants more work for a DX station. WA7WOC, Box 1411, Carefree, AZ 85377.

F6FNU, QSL Manager for 3B9FR, would like IRCs rather than green stuff sent with QSL requests. The green stuff seems to leak through the envelopes . . . or something. G4IUF is returning cards for 3AØFC, saying that it is Monaco Slim and possibly actually is in Italy. W8JAQ is in the same fix; he's getting cards for C31IU, Mike. Mike, also K9MW, left Andorra, last operated there in 1983, and currently is in the Netherlands. The station signing C31IU also gives W9FSS as a route; W9FSS became a Silent Key in 1985. 9J2EZ has left Zambia and is back in Italy. As of October 1st of this year, Bob Kaplan, WA4WTG, is no longer servicing the QSLs for V2AK, 8P6BN, 6Y5RL, and P29RY.

CY9DXX to VE1AL
C3ØEAM to DL4ZBK
C3ØFLK to SJ1RL
ED3EPL to EA3CUU
EKØAKW to UZ9OWD
EKØAL to UWØMF
EKØALK to UWØMF
EL2JM to KA5ZMK
FH5EG to F6EZV
FH5EF to F6EZV
FP5DF to K2RW
FR4FA/J to F6FNU
FP/WB9LVV to WD9BHB
FK/FD1MXQ to F-Buro
FT9ZD to F6ESH (new)
G4PET/HH2 to G4PET
G4PEU/HH2 to G4PEU
HBØ/DL1GSB to DL1GSB
HG6OYL to HA8KAZ
HL88LW to HL1LW
HL9AJ to N5TP
JY9LC to 88 CB
K2ØØJHM to KH6BZF
K4SXT/DU3 to WB4KZW
KG4CL to KC3CL
LU5EAS/Z to LU5DNH
LS4CSI to LU4BR
OHØBDA to OH2BDA
S79MX to HB9MX
TQ6UN to F5AM
UJ8JCM to UJ8JCQ
W5KNE/VE1 to W5KNE
VE2LJ to VE3JDO
VE8PW to VE-Buro
VE8YQ to WA9AEA
VP5LJ to WN5K
VP8BRR to G4YLO
VP8BRT to G4WFZ
VK9LS to JH1LKH
VP2MW to KM5R
WB2ØØYPX to KI6X
YB2AR to YBØSY
YJ8AA to JH3DPB
ZL5BA to KB4GID
3B9FR to F6FNU
5K6P to HK6LRP
8J6SLK/3 to JARL-Buro
8J4XPO to JARL-Buro
8Q7MT to JA1DBQ
9H3EH to DL2GBT
9J2EJ to I4FGG
9J2Ø to IK4DBZ
CEØDFL to Box 7, Easter Island, Chile
EL5F to Box 513, Monrovia, Liberia
GB75USA to Box 219, APO New York 09210
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1 ANTENNA = 9 BANDS

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MODEL	BANDS	LENGTH
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GD-8:	80-40-30-20-17-15-12-10M	137'
GD-7:	160-80-40-20-17-12-10M	255'
GD-9:	160-80-40-30-20-17-15-12-10M	255'

Choose between 500W PEP or 2KW versions. Install as a horizontal dipole or an inverted-V. SWR usually better than 1.5:1. No tuner needed if properly installed. See letters of our ham customers in our data report. The GD-windom dipoles are no dummy load antennas. Our special GD-balun (500W or 2KW) matches the low impedance (50Ω) coax feedline to the high impedance windom-type antenna. All GARANT GD-windom dipoles come with a 3-year limited warranty and a 10-day money-back guarantee. Who else has that much confidence in his products?

VE2MNL, Michel: "I have installed my GD-7. Only one antenna to cover 7 bands with practically perfect SWR on all bands. **VE1AZZ**, Gordon on his GD-8: "I find the SWR exactly as you claimed." **VE7TH**, John on his GD-9: "FB on all bands. Great for DX." **VE7BKU**, Rob on his GD-8: "A great antenna. Excellent bandwidth." **VE1VCD**, Stu: "Very pleased with the GD-6/2KW. In less than six months operation have logged over 85 different countries. Recommend it to anyone considering a wire antenna."

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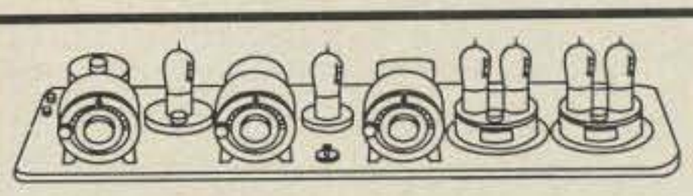

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CIRCLE 88 ON READER SERVICE CARD

Propagation

a monthly feature by
GEORGE JACOBS, W3ASK

THE SCIENCE OF PREDICTING RADIO CONDITIONS

Bulletin

This issue of *CQ* should reach most readers in time for the CW weekend of the *CQ* World-Wide DX Contest, November 26–27. Here is an updated day-to-day propagation forecast for the weekend made at press time. All indications are that it should be a really good, perhaps even a great, weekend for the contest. The sunspot count on both days is expected to be near the 150 level, with a 10.7 cm solar flux count expected in the 175 range.

Alpha (A) index for the geomagnetic field is expected to be generally quiet, ranging between 10 and 20. Expect generally High Normal conditions on both November 26 and 27, with good possibilities for it to climb to Above Normal on the 27th.

The new solar cycle continues to rise rapidly. The Royal Observatory of Belgium reports a monthly mean sunspot number of 111.2 for August 1988. Solar activity varied widely during the month, ranging from a low of 22 on August 22nd to a high of 171 reported on the 9th. This monthly value results in a smoothed sunspot number of 64 centered on February 1988. The progress of a sunspot cycle is measured by the value of smoothed sunspot number. Based upon the present rate of cycle rise, a smoothed sunspot number in the range of 125 is forecast for December 1988.

There was a corresponding increase in the 10.7 cm solar flux level as reported by the Algonquin Radio Observatory in Ottawa, Canada. The monthly mean value for August was 154, with daily levels ranging between 112 and 191. A mean of approximately 165 is expected during December.

Check the Last Minute Forecast appearing in this month's column for day-to-day conditions expected throughout the month of December.

December Band Openings

As a result of rapidly rising solar levels, beginning this month the best times for *6* meter F-2 layer ionospheric DX openings are included in the DX Propagation Charts.

11307 Clara Street, Silver Spring, MD 20902

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for December 1988

	Expected Signal Quality			
Propagation Index	**(4)**	**(3)**	**(2)**	**(1)**
Above Normal: 6, 11, 23-24	**A**	**A**	**B**	**C**
High Normal: 4, 10, 14-15, 18, 22, 25	**A**	**B**	**C**	**C-D**
Low Normal: 1, 5, 7, 12-13, 16-17, 19-21, 26, 31	**B**	**C**	**D**	**D-E**
Below Normal: 2-3, 8-9, 27-28, 30	**C**	**C-D**	**D-E**	**E**
Disturbed: 29	**C-D**	**D**	**E**	**E**

Where expected signal quality is: **A—Excellent opening, exceptionally strong, steady signals greater than S9.**

B—Good opening, moderately strong signals varying between S6 and S9+, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.

D—Poor opening, with weak signals varying between S0 and S3, and with considerable fading and noise.

E—No opening expected. 3 dB per S-Unit.

HOW TO USE THIS FORECAST

1. Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.

2. With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be good-to-fair (B-C) on December 1st, fair-to-poor (C-D) on the 2nd and 3rd, good (B) on the 4th, good-to-fair (B-C) on the 5th, excellent (A) on the 6th, etc.

Continuing high solar activity coupled with seasonally peak ionization levels in the northern hemisphere should result in generally good-to-excellent DX propagation conditions on all HF bands.

Excellent *daytime* DX openings to all areas of the world should be possible on the *10*, *15*, and *20* meter bands. Also expect exceptional conditions on the *6* meter band, with peak conditions likely towards Europe, Africa, and in a generally easterly direction an hour or two before noon, towards Central and South America and the Caribbean area from an hour or two after noon, and towards the Pacific, Australasia, and the Far East during the late afternoon and into the sunset period. The best days to look for DX openings on *6* meters are those expected to be High or Above Normal.

From *sundown* to *midnight*, look for DX openings towards the south and west on both *15* and *20* meters, and to most other areas of the world on *40* and *80* meters. Fairly good DX openings on the *160* meter band should be possible from the eastern half of the country towards the north, east, and south.

From *midnight* to *sunrise* the best DX bands should be *40* and *80* meters, with openings also possible to many areas of the world on *20* and *160* meters.

DX propagation conditions on the *160* meter band are usually at their seasonal peak during December. The band should open towards Europe and in an easterly direction beginning about 8 p.m. in all time zones, and continuing until 3 a.m. in the EST zone, 1 a.m. in CST, midnight in MST, and 11 p.m. in PST. These openings favor locations in the eastern half of the USA. Openings towards the south, particularly to Central America, the Caribbean area, and the northern countries of South America should be possible from about 10 p.m. to 3 a.m. in all time zones. Openings towards the Pacific, Australasia, and the Far East will favor stations in the western half of the country, but it may be worth the time to check for these openings in other areas as well between 4 a.m. and local sunrise.

Remember the old rule that applies to *160* meter DX openings, and to *40* and *80* meters as well: optimum conditions occur about the time that the sun begins to *rise* at the *easternmost* terminal of the path.

For *short-skip* openings during December try the *80* and *40* meter bands during the day for paths less than 250 miles, and *80* and *160* meters at night over these distances. For openings between 250 and 750 miles, *40* meters should be best during the day, and both *80* and *160* meters at night. Between 750 and 1300 miles, try *20* during the day, *40* and *80* meters from sunset to midnight, and *80* meters later in the evening and until sunrise. Try *40* meters again for about an hour or so after sunrise. For openings between 1300 and 2300 miles, it should be a toss-up between *20* and *15* meters during the day, with *10* meters running close behind. Try *20* and *40* meters from sundown to midnight, then check *40* and *80* meters until sunrise. Try *40* meters again for an hour or so after sunrise.

This month's column contains DX Propagation Charts valid through mid-February. Short-Skip Propagation Charts for December appeared in last month's column.

VHF Ionospheric Openings

The best times to check for worldwide *6* meter openings on this band have been

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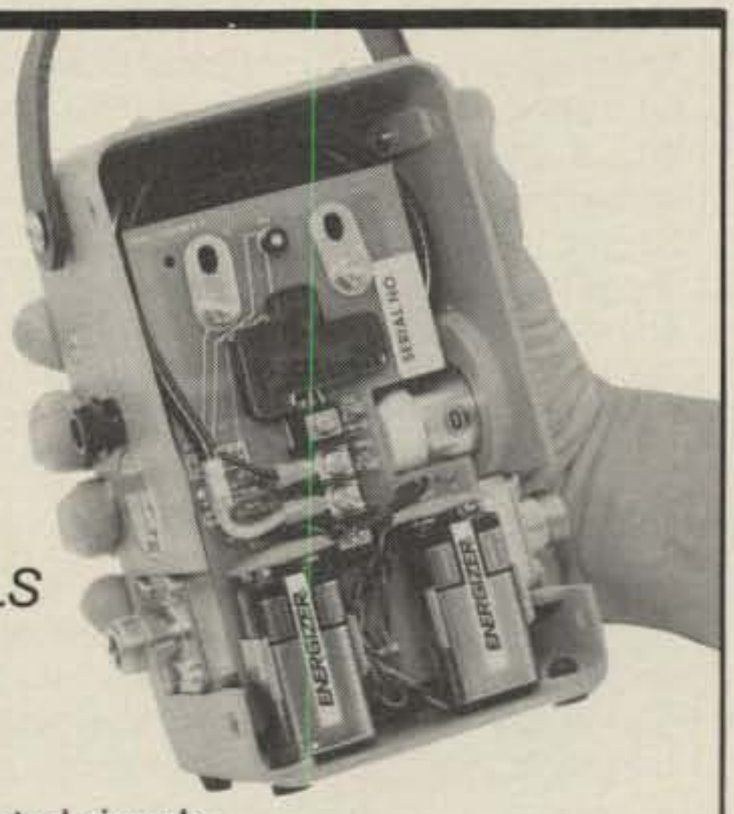
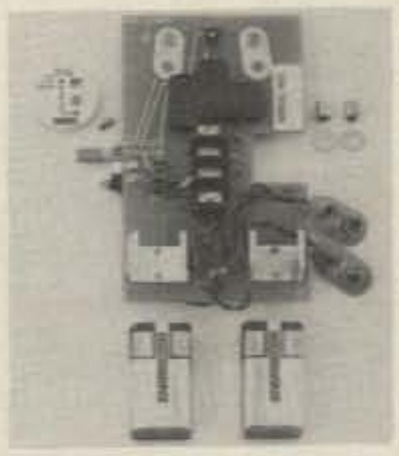


MEASURES PEAK POWER OF SSB AND OTHER AM SIGNALS

Bird Model 4300-400 modification kit quickly adapts any Bird Model 43 Wattmeter to measure audio peak power of single sideband and other AM modulated signals.



The 4300-400 kit pc board mounts inside the Model 43 housing, on the meter studs. Estimated conversion time is only 15 minutes from start to finish.

Once modified, you can measure peak power to an 8% F.S. accuracy, without affecting cw operation or accuracy.

And, the Model 4300-400 is surprisingly inexpensive. Contact your Bird distributor or factory for details.

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CIRCLE 35 ON READER SERVICE CARD

given earlier in this column. They are also indicated by ** in the DX Propagation Charts. The combination of high solar activity and seasonally high ionization in the F-2 layer may produce some good DX openings on *6* meters this month. A secondary seasonal peak in sporadic-E ionization should also result in some short-skip openings on this band between distances of approximately 800 and 1300 miles.

There is considerably less likelihood for *6* meter trans-equatorial (TE) openings during December, but some should be possible between the southern tier states and countries deep in South America. The best time to check for TE openings is during the evening hours between 8 and 11 p.m.

Quite a bit of meteor shower activity is expected this month, and this should result in improved conditions for meteor-scatter-type openings on the VHF bands for distances up to approximately 1,000 miles. The *Geminids*, a major meteor shower, should begin on December 12 and last for about three days. Maximum intensity is expected at about 5 p.m. EST on December 13, with an estimated meteor rate of about one a minute. The *Ursids*, a considerably less intense shower, is expected to take place on December 21 and 22. It should peak at approximately 2 a.m. EST on December 22, with a meteor rate of approximately 15 an hour.

Auroral displays often increase during December and are most likely to occur when HF conditions are Below Normal or Disturbed. Check the Last Minute Forecast at the beginning of this column for those days during December that are expected to be in these categories. On these days there is a good possibility for short-skip auroral-type propagation to take place on the VHF bands for distances up to approximately 1,000 miles.

Sunspots Make News

The August 27th edition of the *Washington Post* carried an excellent article by Philip J. Hilts entitled "Sunspots May Hit 200 Year Peak, Play Havoc With Communications." It discusses sunspots and sunspot cycles in general, pointing out that the unprecedented rapid rise in the present cycle may result in record-breaking peak intensity. There is also an interesting discussion on how some sunspots develop into solar flares, spewing high-energy radiation into the earth's atmosphere, thus disrupting HF communications, increasing the risk of radiation exposure to astronauts and satellites in space, building up high electrical charges which can damage computers and circuit boards, and causing widespread brilliant auroral displays. The article correctly stresses that as the solar cycle rises, the number of solar flares increases and the earthly effects associated with them are

HOW TO USE THE DX PROPAGATION CHARTS

1. Use Chart appropriate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8, KP4, KG4 and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9 and 0 areas; the Western USA Chart in the 6 and 7 areas, and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (15 through 80 Meters) for a particular DX region, as shown in the left hand column of the Charts. An * indicates the best time to listen for 160 meter openings.

3. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of *days* during the month on which the opening is expected to take place as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this Propagation column for the actual *dates* on which an opening with specific propagation index is likely to occur, and the signal quality that can be expected.

4. Time shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M., 13 is 1 P.M., etc. Appropriate *daylight* time is used *not* GMT. To convert to GMT, add to the times shown in the appropriate chart 7 hours in PDT Zone, 6 hours in MDT Zone, 5 hours in CDT Zone, and 4 hours in EDT Zone. For example, 14 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 03 GMT, etc.

5. The charts are based upon a transmitter power of 250 watts c.w., or 1 kw, p.e.p. on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 db gain above these reference levels, the *propagation index* will increase by one level; for each 10 db loss, it will lower by one level.

6. Propagation data, contained in the Charts has been prepared from basic data published by the Institute For Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado, 80302.

December 15, 1988-February 15, 1989
Time Zone: EST (24-Hour Time)
EASTERN USA TO:

	10/6 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	07-08 (1) 08-09 (2) 09-13 (4) 13-14 (2) 14-15 (1) 09-11 (1)**	06-07 (1) 07-08 (2) 08-14 (4) 14-15 (2) 15-16 (1)	03-06 (2) 06-07 (3) 07-09 (4) 09-10 (3) 10-12 (2) 12-13 (3) 13-16 (4) 16-18 (3) 18-21 (2) 21-23 (1) 23-01 (2) 01-03 (3)	14-16 (1) 16-17 (2) 17-19 (3) 19-02 (4) 02-03 (3) 03-04 (2) 04-05 (1) 17-19 (1)* 19-20 (2)* 20-02 (3)* 02-03 (2)* 03-04 (1)*
Northern Europe & European USSR	07-08 (1) 08-09 (3) 09-10 (4) 10-11 (2) 11-12 (1) 08-10 (1)**	06-07 (1) 07-08 (2) 08-09 (3) 09-11 (4) 11-12 (3) 12-13 (2) 13-14 (1)	04-06 (1) 06-07 (2) 07-09 (3) 09-14 (2) 14-16 (3) 16-18 (4) 18-20 (3) 20-23 (2) 23-02 (1)	17-19 (1) 19-01 (2) 01-03 (1) 19-02 (1)*
Eastern Mediterranean & Middle East	07-08 (1) 08-09 (3) 09-11 (4) 11-12 (3) 12-13 (2) 13-14 (1) 09-11 (1)**	07-08 (1) 08-09 (2) 09-11 (4) 11-14 (3) 14-15 (2) 15-16 (1)	07-10 (1) 10-13 (2) 13-16 (3) 16-18 (4) 18-22 (3) 22-01 (2) 01-03 (1)	18-20 (1) 20-22 (2) 22-00 (3) 00-01 (2) 01-02 (1) 20-00 (1)*
Western Africa	07-08 (1) 08-09 (2) 09-12 (3) 12-16 (4) 16-17 (3) 17-18 (2) 18-19 (1) 08-10 (1)**	05-06 (1) 06-08 (2) 08-14 (3) 14-19 (4) 19-20 (3) 20-22 (2) 22-23 (1)	03-04 (3) 04-06 (2) 06-13 (1) 13-15 (2) 15-17 (3) 17-00 (4) 00-01 (3) 01-03 (2)	18-20 (1) 20-23 (2) 23-01 (3) 01-03 (2) 03-04 (1) 22-03 (1)*
Eastern & Central Africa	08-09 (1) 09-11 (2) 11-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1) 08-10 (1)**	06-08 (1) 08-12 (2) 12-14 (3) 14-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	01-04 (2) 04-06 (1) 06-08 (2) 08-14 (1) 14-16 (2) 16-17 (3) 17-23 (4) 23-01 (3)	18-21 (1) 21-23 (2) 23-01 (1) 21-00 (1)*
Southern Africa	07-08 (1) 08-11 (3) 11-14 (4) 14-15 (3) 15-16 (2) 16-17 (1) 08-10 (1)**	06-08 (1) 08-11 (2) 11-13 (3) 13-16 (4) 16-18 (3) 18-19 (2) 19-20 (1)	06-08 (1) 12-14 (1) 14-15 (2) 15-17 (3) 17-20 (4) 20-00 (3) 00-02 (2) 02-04 (1)	18-19 (1) 19-22 (2) 22-00 (1) 19-22 (1)*
Central & South Asia	08-09 (1) 09-10 (2) 10-11 (1) 17-19 (1)	07-08 (1) 08-10 (2) 10-11 (1) 17-19 (1)	06-07 (1) 07-09 (3) 09-10 (2) 10-11 (1) 17-19 (1) 22-23 (1) 23-00 (2) 00-01 (1)	06-08 (1) 18-20 (1)
Southeast Asia	09-11 (1) 11-14 (2) 14-15 (1) 18-19 (1) 19-20 (2) 20-21 (1)	09-10 (1) 10-12 (2) 12-13 (1) 18-19 (1) 19-21 (2) 21-22 (1)	06-07 (1) 07-09 (2) 09-11 (1) 16-18 (1) 18-21 (2) 21-23 (1)	05-07 (1) 17-19 (1)
Far East	17-18 (1) 18-19 (3) 19-20 (2) 20-21 (1)	09-11 (1) 16-17 (1) 17-18 (2) 18-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	00-04 (2) 04-07 (1) 07-09 (2) 09-11 (1) 16-18 (1) 18-19 (2) 19-22 (3) 22-00 (2)	04-05 (1) 05-07 (2) 07-08 (1) 05-07 (1)*
South Pacific & New Zealand	10-13 (1) 13-15 (2) 15-16 (3) 16-19 (4) 19-20 (2) 20-21 (1) 17-19 (1)**	08-09 (1) 09-11 (2) 11-15 (1) 15-17 (2) 17-18 (3) 18-20 (4) 20-21 (3) 21-22 (2) 22-23 (1)	12-19 (1) 19-21 (2) 21-22 (3) 22-02 (4) 02-04 (3) 04-07 (2) 07-10 (3) 10-12 (2)	00-02 (1) 02-03 (2) 03-07 (3) 07-08 (2) 08-09 (1) 03-05 (1)* 05-07 (2) 07-08 (1)*
Australasia	08-10 (1) 10-11 (2) 11-12 (1) 15-16 (1) 16-17 (2) 17-18 (3) 18-19 (4) 19-20 (2) 20-21 (1) 17-19 (1)**	09-10 (1) 10-12 (2) 12-15 (1) 15-18 (2) 18-19 (3) 19-21 (4) 21-22 (2) 22-23 (1)	07-09 (3) 09-11 (2) 11-14 (1) 16-18 (2) 20-22 (1) 22-00 (2) 00-05 (3) 05-07 (2)	03-05 (1) 05-08 (2) 08-09 (1) 05-08 (1)*
Caribbean, Central America & Northern Countries of South America	07-08 (1) 08-09 (3) 09-17 (4) 17-18 (3) 18-19 (2) 19-20 (1) 09-11 (1)**	06-07 (1) 07-08 (3) 08-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	07-09 (4) 09-11 (3) 11-14 (2) 14-16 (3) 16-00 (4) 00-02 (3) 02-06 (2) 06-07 (3)	17-18 (1) 18-19 (2) 19-20 (3) 20-04 (4) 04-05 (3) 05-06 (2) 06-07 (1) 19-20 (1)* 20-22 (2)* 22-02 (3)* 02-04 (2)* 04-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	06-07 (1) 07-08 (2) 08-10 (4) 10-11 (3) 11-13 (2) 13-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1) 10-12 (1)**	06-07 (1) 07-08 (3) 08-10 (4) 10-11 (3) 11-13 (2) 14-16 (3) 16-20 (4) 20-21 (2) 21-22 (1)	07-08 (2) 08-14 (1) 14-16 (2) 16-18 (3) 18-00 (4) 00-02 (3) 02-04 (2) 04-07 (3)	19-21 (1) 21-04 (2) 04-05 (1) 21-04 (1)*
McMurdo Sound, Antarctica	08-10 (1) 17-19 (1)	06-09)1) 15-17 (1) 17-18 (2) 18-20 (3) 20-22 (2) 22-23 (1)	17-20 (1) 20-21 (2) 21-00 (3) 00-02 (2) 02-04 (3) 04-05 (2) 05-06 (1) 06-08 (2) 08-09 (1)	00-06 (1)

Time Zones: CST & MST (24-Hour Time)
CENTRAL USA TO:

	10/6 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Southern Europe & North Africa	07-08 (1) 08-09 (3) 09-11 (4) 11-12)2) 12-13 (1) 08-10 (1)**	06-07 (1) 07-08 (2) 08-12 (4) 12-13 (2) 13-14 (1)	02-06 (1) 06-07 (2) 07-09 (3) 09-11 (2) 11-13 (3) 13-15 (4) 15-17 (3) 17-19 (2) 19-23 (1) 23-02 (2)	15-17 (1) 17-18 (1) 18-01 (3) 01-02 (2) 02-03 (1) 17-20 (1)* 20-01 (2)* 01-02 (1)*
Northern & Central Europe & European USSR	07-08 (1) 08-09 (2) 09-10 (3) 10-11 (2) 11-12 (1)	06-07 (1) 07-08 (2) 08-10 (4) 10-11 (3) 11-12 (2) 12-13 (1)	04-07 (1) 07-09 (3) 09-13 (2) 13-15 (3) 15-16 (4) 16-18 (3) 18-20 (2) 20-22 (1) 22-01 (2) 01-02 (1)	17-19 (1) 19-22 (2) 22-01 (1) 19-00 (1)*

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Eastern Mediterranean & Middle East	08-09 (1) 09-10 (2) 10-11 (3) 11-12 (2) 12-13 (1)	07-08 (1) 08-10 (3) 10-11 (4) 11-12 (2) 12-13 (1)	07-10 (1) 10-13 (2) 13-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-21 (1) 21-23 (2) 23-01 (1)	18-20 (1) 20-22 (2) 22-23 (1) 20-22 (1)*
Western Africa	07-08 (1) 08-09 (2) 09-11 (3) 11-14 (4) 14-16 (3) 15-17 (2) 17-18 (1) 09-11 (1)*	06-08 (1) 08-10 (2) 10-14 (3) 14-17 (4) 17-18 (3) 18-20 (2) 20-21 (1)	06-13 (1) 13-15 (2) 15-17 (3) 17-21 (4) 21-23 (3) 23-01 (2) 01-03 (1) 03-06 (2)	18-20 (1) 20-23 (2) 23-02 (1) 20-23 (1)*
Eastern & Central Africa	07-08 (1) 08-09 (2) 09-13 (3) 13-14 (4) 14-15 (3) 15-16 (2) 16-17 (1) 10-12 (1)**	06-08 (1) 08-12 (2) 12-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	07-14 (1) 14-16 (2) 16-17 (3) 17-20 (4) 20-22 (3) 22-00 (2) 00-02 (1)	19-00 (1) 20-22 (1)*
Southern Africa	07-08 (1) 08-09 (2) 09-11 (3) 11-13 (4) 13-14 (3) 14-15 (2) 15-16 (1) 08-10 (1)**	07-09 (1) 09-11 (2) 11-12 (3) 12-15 (4) 15-17 (3) 17-18 (2) 18-19 (1)	06-13 (1) 13-15 (2) 15-17 (3) 17-19 (4) 19-22 (3) 22-01 (2) 01-03 (1)	18-19 (1) 19-21 (2) 21-22 (1) 19-21 (1)*
Central & South Asia	08-09 (1) 09-10 (2) 10-11 (1) 18-19 (1) 19-20 (2) 20-21 (1)	07-08 (1) 08-10 (2) 10-11 (1) 18-19 (1) 19-21 (2) 21-22 (1)	04-06 (1) 06-07 (2) 07-09 (3) 09-10 (2) 10-11 (1) 17-18 (1) 18-19 (2) 19-21 (3) 21-23 (2) 23-02 (1)	06-08 (1) 18-20 (1)
Southeast Asia	09-10 (1) 10-13 (2) 13-14 (1) 16-17 (1) 17-19 (3) 19-20 (2) 20-21 (1)	08-09 (1) 09-10 (2) 10-12 (3) 12-13 (2) 13-14 (1) 16-18 (1) 18-20 (3) 20-21 (2) 21-22 (1)	06-07 (1) 07-09 (2) 09-10 (3) 10-12 (2) 12-14 (1) 16-18 (1) 18-20 (2) 20-21 (3) 21-22 (2) 22-23 (1)	04-07 (1) 17-19 (1)
Far East	15-16 (1) 16-17 (2) 17-19 (4)	08-10 (1) 15-16 (1) 16-17 (2)	02-03 (2) 03-06 (1) 06-07 (2)	02-03 (1) 03-07 (2) 07-09 (1)
	19-20 (2) 20-21 (1) 17-19 (1)*	17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	07-09 (3) 09-10 (2) 10-11 (1) 15-18 (1) 18-20 (2) 20-22 (3)	03-07 (1)*
South Pacific & New Zealand	09-11 (1) 11-14 (2) 14-15 (3) 15-18 (4) 18-19 (3) 19-20 (2) 20-21 (1) 16-18 (1)**	07-09 (1) 09-11 (2) 11-13 (3) 13-16 (2) 16-17 (3) 17-19 (4) 19-21 (3) 21-22 (2) 22-23 (1)	10-17 (1) 17-19 (2) 19-20 (3) 20-00 (4) 00-04 (3) 04-06 (2) 06-07 (3) 07-08 (4) 08-09 (3) 09-10 (2)	23-01 (1) 01-02 (2) 02-07 (3) 07-08 (2) 08-09 (1) 00-02 (1)* 02-07 (2)* 07-08 (1)*
Australasia	08-09 (1) 09-11 (2) 11-14 (1) 14-16 (2) 16-17 (3) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1) 17-19 (1)**	07-08 (1) 08-09 (2) 09-10 (3) 10-11 (2) 11-13 (1) 13-17 (2) 17-19 (3) 19-21 (4) 21-22 (2) 22-23 (1)	04-07 (2) 07-09 (4) 09-10 (3) 10-11 (2) 11-15 (1) 15-17 (2) 17-20 (1) 20-23 (2) 23-04 (3)	02-04 (1) 04-07 (2) 07-09 (1) 03-06 (1)*
Caribbean, Central America & Northern Countries of South America	07-08 (1) 08-09 (3) 09-11 (4) 11-13 (3) 13-16 (4) 16-17 (3) 17-18 (2) 18-19 (1) 09-11 (1)**	06-07 (1) 07-08 (3) 08-11 (4) 11-13 (3) 13-18 (4) 18-19 (3) 19-21 (2) 21-22 (1)	06-07 (3) 07-09 (4) 09-11 (3) 11-14 (2) 14-16 (3) 16-23 (4) 23-02 (3) 02-06 (2)	17-18 (1) 18-19 (2) 19-21 (3) 21-04 (4) 04-05 (2) 05-07 (1) 19-20 (1)* 20-22 (2)* 22-01 (3)* 01-02 (2)* 02-04 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	06-07 (1) 07-08 (2) 08-10 (4) 10-11 (3) 11-13 (2) 13-14 (3) 14-17 (4) 17-18 (3) 18-19 (2) 19-20 (1) 09-11 (1)**	06-07 (1) 07-08 (3) 08-10 (4) 10-— (3) 11-13 (2) 13-15 (3) 15-20 (4) 20-21 (3) 21-22 (2) 22-23 (1)	02-06 (2) 06-07 (3) 07-08 (2) 08-14 (1) 14-16 (2) 16-18 (3) 18-00 (4) 00-02 (3)	19-21 (1) 21-04 (2) 04-06 (1) 21-05 (1)*
McMurdo Sound, Antarctica	08-10 (1)	06-08 (1) 08-10 (2) 10-12 (1) 15-17 (1) 17-18 (2) 18-22 (3) 22-23 (2) 23-00 (1)	16-18 (1) 18-20 (2) 20-02 (3) 02-04 (2) 04-06 (1) 06-08 (2) 08-09 (1)	23-05 (1)

Time Zone: PST (24-Hour Time)
WESTERN USA TO:

	10/6 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Southern Europe & North Africa	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1)	06-07 (1) 07-08 (2) 08-09 (3) 09-11 (4) 11-12 (2) 12-13 (1)	05-06 (1) 06-09 (2) 09-12 (3) 12-14 (4) 14-15 (3) 15-17 (2) 17-19 (1) 22-01 (2)	18-20 (1) 21-00 (2) 00-01 (1) 19-23 (1)*
Central & Northern Europe & European USSR	07-08 (1) 08-10 (2) 10-11 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1)	05-06 (1) 06-07 (2) 07-09 (3) 09-11 (2) 11-14 (1) 14-16 (3) 16-18 (2) 18-21 (1) 21-00 (2)	18-20 (1) 20-23 (2) 23-00 (1) 19-22 (1)*
Eastern Mediterranean & Middle East	07-08 (1) 08-10 (2) 10-11 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1)	06-07 (1) 07-10 (2) 10-14 (1) 14-16 (3) 16-17 (2) 17-20 (1) 20-23 (2)	07-09 (1) 18-22 (1)
Western Africa	07-08 (1) 08-09 (2) 09-11 (3) 11-13 (4) 13-15 (3) 15-16 (2) 16-17 (1) 09-11 (1)**	06-07 (1) 07-08 (2) 08-13 (3) 13-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	05-12 (1) 12-14 (2) 14-16 (3) 16-19 (4) 19-22 (3) 22-00 (2) 00-02 (1)	18-19 (1) 19-21 (2) 21-22 (1) 19-21 (1)*
Eastern & Central Africa	07-08 (1) 08-10 (2) 10-13 (3) 13-14 (2) 14-15 (1) 09-11 (1)**	06-08 (1) 08-12 (2) 12-15 (3) 15-17 (2) 17-18 (1)	06-07 (1) 07-09 (2) 09-14 (1) 14-16 (2) 16-21 (3) 21-23 (2) 23-00 (1)	18-22 (1) 07-09 (1)
Southern Africa	07-08 (1) 08-10 (3) 10-12 (4) 12-13 (3) 13-14 (2) 14-15 (1) 08-10 (1)**	07-09 (1) 09-12 (2) 12-13 (3) 13-15 (4) 15-17 (2) 17-18 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-16 (3) 16-18 (4) 18-20 (3) 20-00 (2) 00-02 (1)	18-19 (1) 19-20 (2) 20-21 (1) 18-19 (1)*

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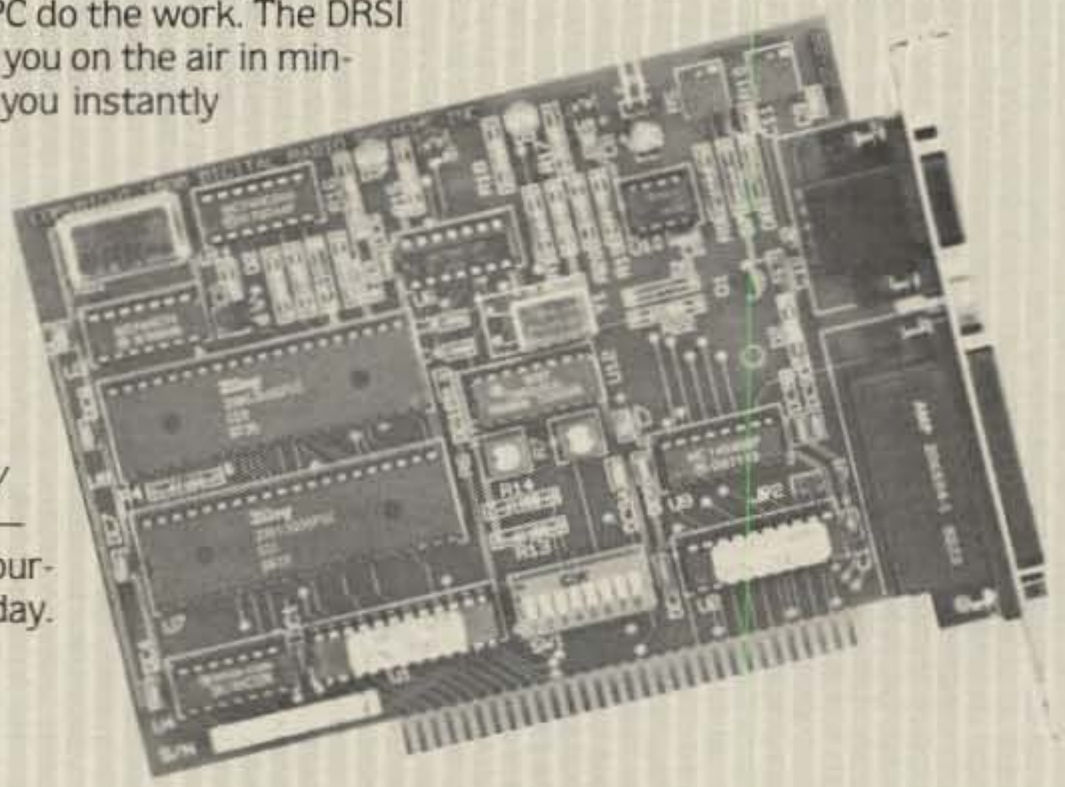

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Serge Canivenc, F8SH Silent Key

It is with deep personal sorrow that I report the recent sudden death of a good friend and professional colleague, Serge Canivenc, F8SH, of Perros Guirec, France.

For almost 40 years Serge's professional career and mine paralleled each other in the field of radio propagation. We began corresponding in the early 1950s when I was doing my graduate work in wave propagation and he was gaining hands-on experience at an ionospheric sounding station in what was then French Equatorial Africa.

Shortly after I became Propagation Editor for *CQ*, Serge began his monthly Propagation column in *Radio-Ref*, the Journal of the French amateur radio society. His book, *La Propagation Des Ondes*, published shortly after mine, is a leading source of HF propagation information in the French language.

In the 1960s, with the birth of the space age, Serge joined the Centre National D'Etudes des Telecommunications (CNET) at Lannion, France. CNET is the French equivalent of NASA, and there Serge played an important role in developing France's worldwide satellite telecommunication networks. He held this position until his untimely death on July 5th of this year at the age of 65.

Serge as F8SH was a very active radio amateur on both HF and VHF. He specialized in the study of sporadic-E propagation, and for almost two decades was the Region I (Europe and Africa) coordinator for such studies for the International Amateur Radio Union (IARU). He also was a representative of France to Study Groups 6 and 8 (HF and VHF propagation) of the International Radio Consultative Committee of the ITU.

Besides corresponding regularly and working each other on the HF bands, I had the pleasure of several eyeball meetings with Serge in Paris, Washington, and Geneva.

Heartfelt condolences are extended to his wife, Andree, and to his children and grandchildren. Serge Canivenc is now a silent key, but his valuable technical and scientific contributions in the field of radio propagation stand as an eternal tribute to a dear friend who will be missed sorely by his family, friends, professional colleagues, and the amateur radio community.

Central & South Asia	06-09 (1) 17-18 (1) 18-19 (3) 19-20 (1)	06-09 (1) 16-17 (1) 17-19 (3) 19-20 (2) 20-21 (1)	06-07 (1) 07-09 (2) 09-11 (1) 16-17 (1) 17-18 (2) 18-19 (3) 19-21 (2) 21-23 (1)	04-09 (1) 17-19 (1)
Southeast Asia	08-09 (1) 09-11 (2) 11-12 (1) 14-15 (1) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1) 15-17 (1)**	07-08 (1) 08-10 (3) 10-11 (2) 11-14 (1) 14-15 (2) 15-18 (3) 18-20 (2) 20-21 (3) 21-22 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1) 15-17 (1) 19-20 (1) 20-22 (2) 22-00 (1)	02-04 (1) 04-07 (2) 07-08 (1) 04-06 (1)*
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Carribbean, Central America & Northern Countries of South America	07-08 (1) 08-09 (3) 09-10 (4) 10-12 (3) 12-15 (4) 15-16 (3) 16-17 (2) 17-18 (1) 08-10 (1)**	06-07 (1) 07-08 (3) 08-10 (4) 10-13 (3) 13-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	06-08 (4) 08-10 (3) 10-13 (2) 13-15 (3) 15-22 (4) 22-00 (3) 00-06 (2)	17-18 (1) 18-19 (2) 19-20 (3) 20-04 (4) 04-05 (2) 05-06 (1) 19-20 (1)* 20-22 (2)* 22-00 (3)* 00-03 (2)* 03-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	06-07 (1) 07-08 (2) 08-09 (4) 09-10 (3) 10-12 (2) 12-13 (3) 13-16 (4) 16-17 (3) 17-18 (2) 18-19 (1) 08-11 (1)**	06-07 (1) 07-08 (3) 08-09 (4) 09-11 (3) 11-13 (2) 13-15 (3) 15-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	05-06 (2) 06-07 (3) 07-08 (2) 08-14 (1) 14-16 (2) 16-18 (3) 18-00 (4) 00-01 (3) 01-03 (2) 03-05 (1)	19-20 (1) 20-22 (2) 22-00 (1) 00-04 (2) 04-05 (1) 20-03 (1)*
McMurdo Sound, Antarctica	07-08 (1) 08-09 (2) 09-10 (1) 19-20 (1) 20-21)2) 21-22 (1)	06-07 (1) 07-09 (2) 09-11 (1) 16-18 (1) 18-20 (2) 20-22 (3) 22-01 (2) 01-02 (2)	16-18 (1) 18-20 (2) 20-03 (3) 03-04 (2) 04-05 (1) 06-07 (1) 07-08 (2) 08-10 (1)	00-05 (1)

Indicates best times to listen for 80 Meter openings. Openings on 160 Meters are also likely to occur during those times when 80 Meter openings are shown with a Propagation Index of (2), or higher.

**Indicates best times to listen for F-2 layer openings on 6 Meters.

expected to increase considerably during the next few years.

The article makes good reading, and I suggest that you try to get a copy from your local library. It appears on page A4 of the August 27th edition.

Holiday Greetings

The Editor of this column would like to extend an old-fashioned holiday wish far and near for good health, good fortune, and good propagation for the coming season. Merry Christmas and a happy 1989.

73, George, W3ASK

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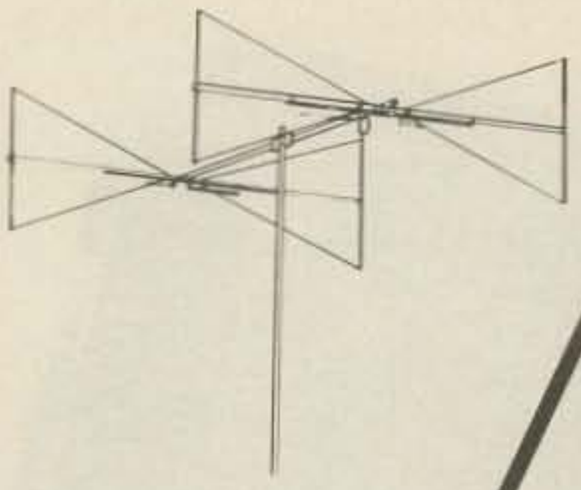

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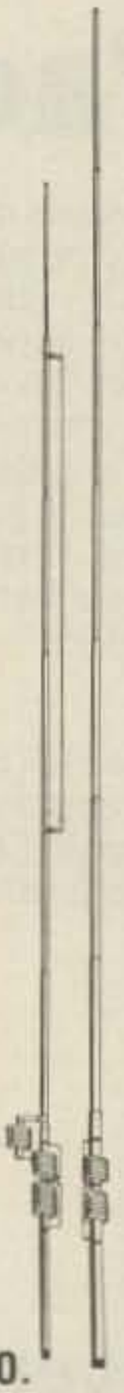

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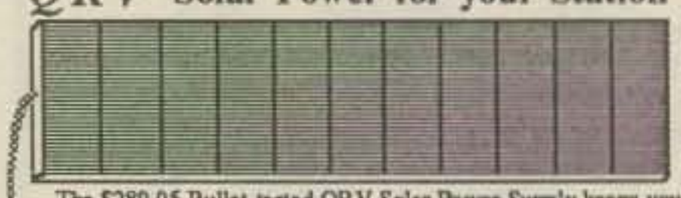

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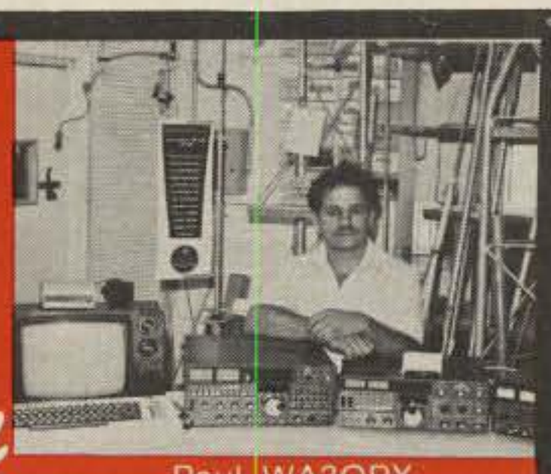

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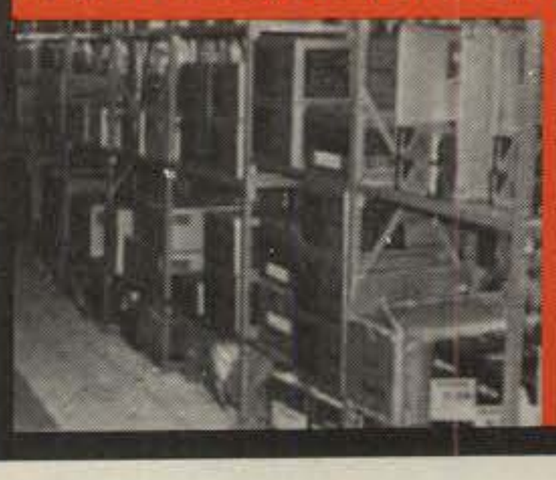

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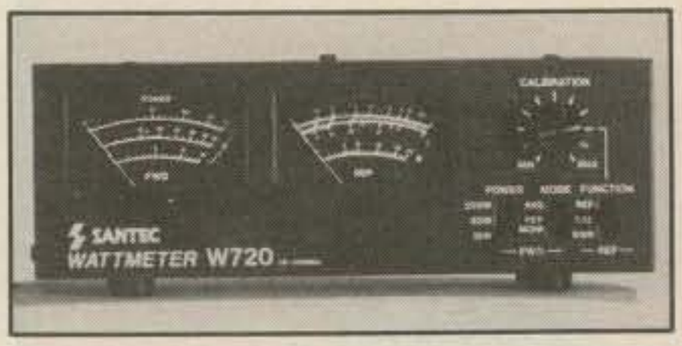

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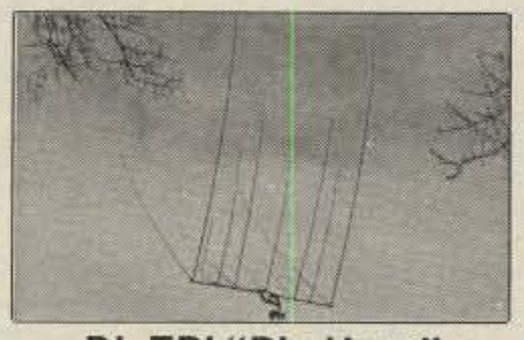

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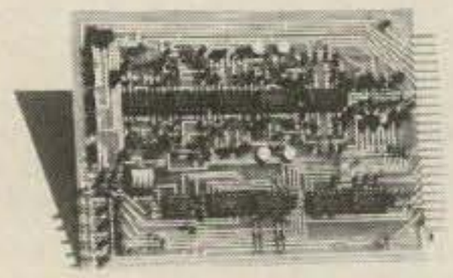

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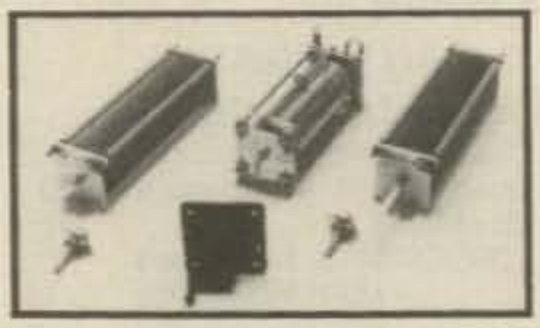

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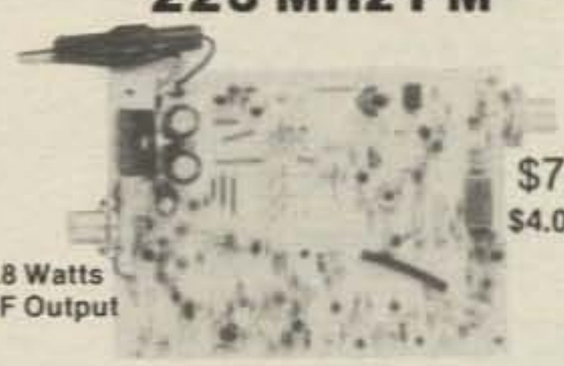

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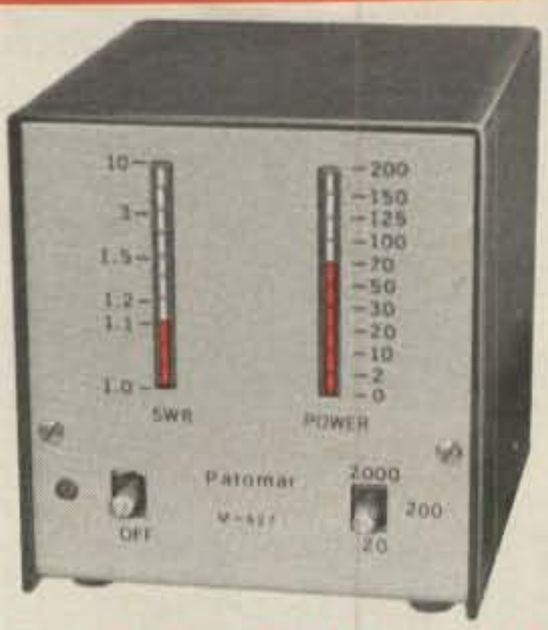

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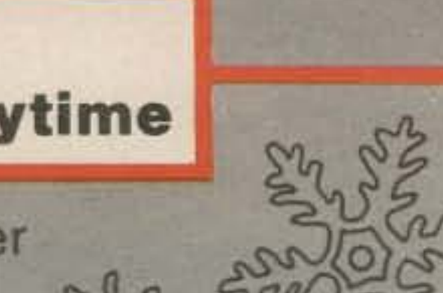

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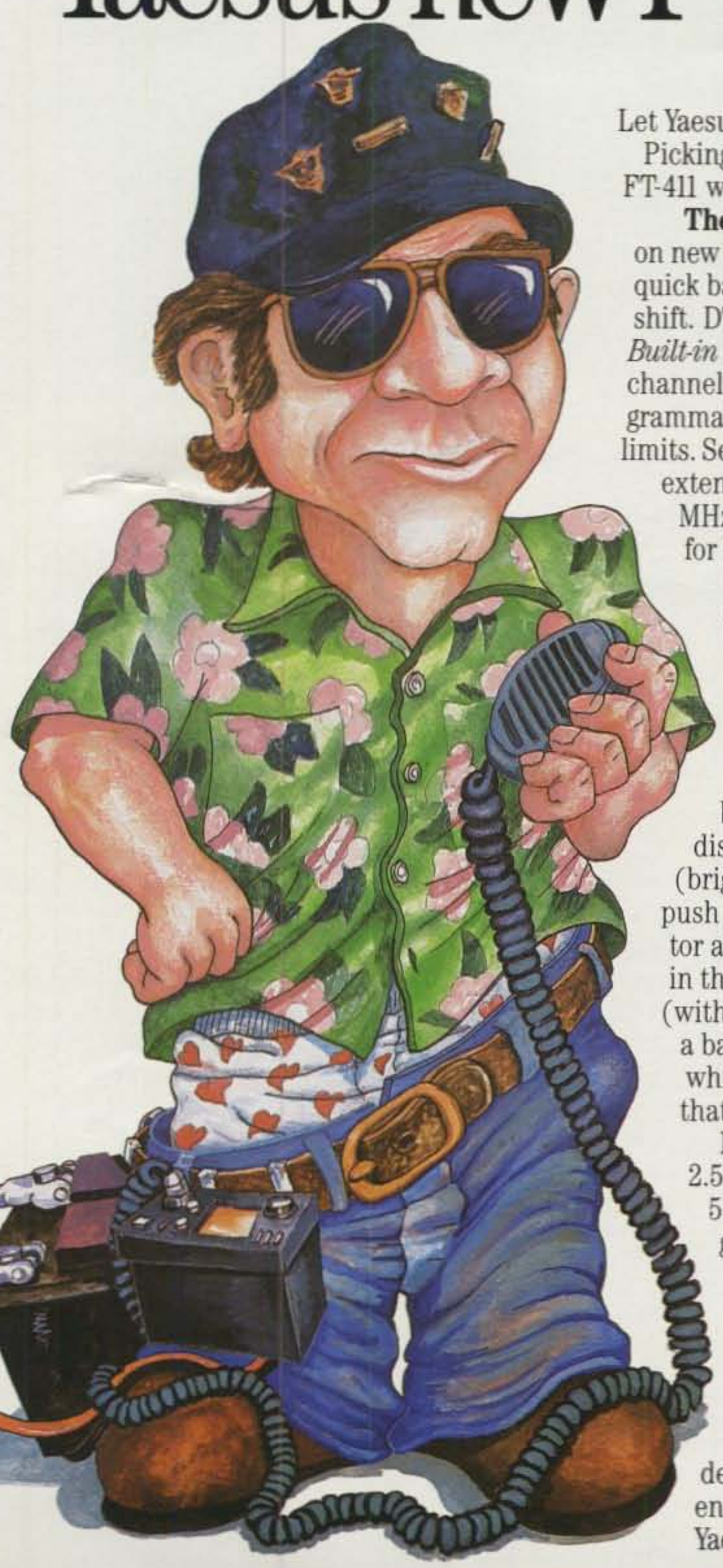

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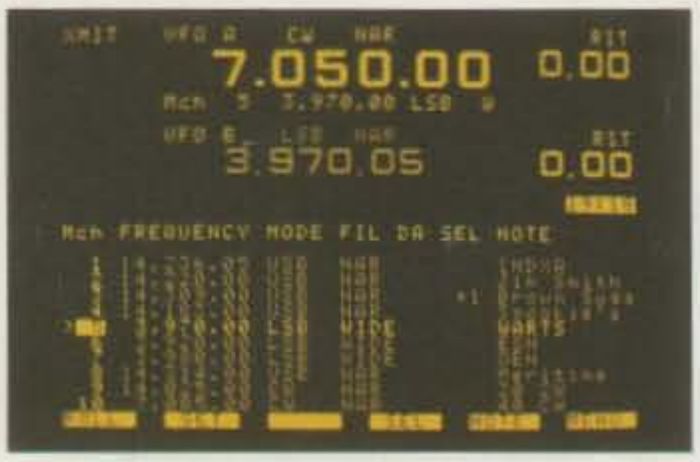

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